Shared Understanding Within Large Information Systems Projects

Thesis

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Shared Understanding
Within Large Information Systems Projects

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A thesis submitted in partial fulfilment for the degree of Doctor of Philosophy

Submission for Examination: December 2014

DATE OF SUBMISSION: 22 DECEMBER 2014.
DATE OF AWARD: 21 JANUARY 2016

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Abstract

This research responds to calls for practice-based research in the field of project management. Undertaken during the development of a sizable public information systems project, it examines the extent to which the professionals engaged in the project shared a common understanding of important matters such as its goals, structure and clients.

The literature review examines the history of project management and its methodologies, the reasons that information systems projects fail, the concept of uncertainty and shared understanding, and risk associated with the development of large scale information systems.

The fieldwork was conducted in 2010. The research adopts an interpretive position and the methodology centred on two series of structured interviews held some eight months apart. Analysis of responses found a low level of shared understanding about all matters investigated amongst the professionals developing the IS.

The overall conclusion of the research is that no evidence was found that the participants in a programme or project have a common, shared understanding of current endeavours and the future envisaged end state. Therefore any project activity that depends on a single shared understanding such as the definition of deliverables and management of the business case, may be ill-founded. Further research into the topic of shared understanding in the context of IS programmes and projects is recommended.

PUBLICATION OF PAPERS

At the time of submission two publications had resulted from this research:

Short, L., Fortune, J. and Peters, G. (2011) 'Sharing understanding across IS programmes', paper presented to OR Conference, University of Nottingham, September.

Fortune, J., Peters, G. and Short, L. (2015) 'Shared understanding during design and delivery: the case of a large-scale information systems programme', International Journal of Project Organization and Management, Vol. 7, No. 4, 327-338.

Chapter 1 Introduction

1.1 The purpose of the research

The motivation to undertake the research reported in this thesis has arisen from personal experience of providing consultancy services to members of teams working on large information systems (IS) projects. The standard procedure when starting an assignment is to be briefed by a senior member of the team, usually the project manager, and then to become more familiar with the work in hand by talking to other members of the team and starting to work alongside them. It has often been the case that there has been a degree of disconnect between the pictures painted by different project participants of the work in hand. These differences have often been difficult to pin down but they have concerned fundamental aspects of the project such as how the project itself is organised and what components will form the system and what aims and objectives have been set for it. Because this is not an experience that was not confined to one or two projects it has caused me to question whether this lack of conformity of view is hindering effective management of projects and leading to failures in some cases and to sub-optimal performance in those projects that are regarded as successful. I therefore decided to undertake research to investigate the extent to which shared understanding was in place amongst a team working on a project to design and develop a large information system.

The research was undertaken during the design and execution of a large-scale integrated information system for the public sector within the UK. (For the purposes of this paper, an information system is defined as *a system to serve purposeful action,* a definition first defined by Checkland and Scholes (1990, p. 876-910). It drew on the concept of shared understanding and looked at the consistency and coherence of the perceptions held by key actors of the purposes of the information system being developed and ways its parts fitted together to form a whole. The underlying notion is that participants in a large IS project need to create shared understanding of the system they are trying to build and of

the workings of the project to create it if that project and the system it produces are to be successful. This notion lies at the heart of some of the most important critical success factors associated with the management of information system projects/programmes. For example, in a review of 63 publications that focus on critical success factors, Fortune and White (2006) identified 'clear realistic objectives' as the second most commonly cited critical success factor for project management with 'good communications' being the fourth most commonly identified factor. Clear objectives and good communication both imply strong similarities between the perceptions and understandings of core participants at all stages of a project.

Of course, it could be argued that one important role of project management methods is to overcome the potential pitfalls of a lack of shared understanding. The use of formal methodologies to organize and manage the design, development and execution of projects is well established and well documented. (See, for example, White and Fortune (2002)). Over the past couple of decades the development of these methods has run alongside increases in the size, scope and complexity of information systems and the desire for them to achieve increasingly ambitious aims. Although varying degrees of flexibility about *how* a project is to be achieved are allowed within these methods, central to any formalised approach to project management is the notion that an understanding of *what* is to be achieved is agreed and shared by the various stakeholders, and in particular by the members of the team that is tasked with designing and building it. For example, commonly deployed methods such as PRINCE2 (OGC, 2009) assume that shared understanding is negotiated and documented that describes a manageable route to a solution to the business problem and also, based on the project mandate and brief, shared understanding in at least broad terms of what the solution will look like. Similarly, Dynamic Systems Development Method (DSDM Consortium, 2008) emphasises the need to understand the business priorities and the business case and acknowledges that achieving shared understanding is problematic. Agile requirement analysis is also not

immune from the need for a clear shared understanding. For example, Ramesh *et al.* (2010) notes that Agile relies heavily on customer involvement to provide detailed requirements and that most agile methods require co-located customers (for example, XP mandates it as a core practice). However, problems persist on such a scale that it is highly likely that project management methods are not fulfilling this aspect of their role successfully.

An important feature of the research reported in this thesis is that it was undertaken during a project and all the participants were professionals who were actively engaged in that project. In recent years there have been a number of calls, such as those by Blomquest *et al.* (2010) and Lalonde *et al.* (2012), to re-balance project management research to increase the emphasis on practice-based research. Cicmil (2006, p. 36) has argued that project theory would be served by a qualitative approach with a critical interpretive approach that makes it possible to 'generate alternative understandings of what goes on in project practice and how practitioners participate in and manage complex organizational arrangements labelled projects in their local environments.' Blomquest *et al.* (2010) go so far as to say 'Research on projects is not only an immature field of research, but it is also insubstantial when it comes to understanding what occurs in projects' (p. 5). They argue:

> A practice approach on project management requires the study of action, activities, and actors within projects.
>
> (Blomquest *et al.* p.9)

and

> A practice approach requires research to look more closely on what is actually being done as people do project management - rather than focusing on models and implementation from a top-down perspective only.
>
> (Blomquest *et al.* p. 13)

Such research into practice is an important topic for investigation because large-scale information system projects are prone to failure (Fortune and Peters, 1995, Fortune and Peters, 2005). As Pardo and Scholl (2002, p. 1656) comment, such projects 'still fail in high numbers [and] the deeper causes of such failures are only partially understood...'. However, the vast majority of research studies into the efficacy of information system (IS) development have been conducted in retrospect i.e. after the systems have been implemented or abandoned. As a consequence, certain aspects of IS development are under-researched or under-evidenced, particularly those that rely on the memory of those involved. 'In-project' perceptions have an important role in shedding light on 'deeper causes' of success and of failure. Kautz *et al.* (2007) say that there is a general shortage of studies in this area and propose a focus on dynamic research questions such as: How is and how can knowledge be acquired and negotiated at and between levels (in an organisation)? How are and how can formal, organizational and informal, social structures be perceived and established at and between the different contextual levels? Moreover, how can theoretical and empirical research best assist practitioners in understanding the underlying problems and their potential solutions? Bostrom (1989) points out that researchers and practitioners agree that having shared, accurate and complete information requirements is essential in developing and implementing information systems. Yet, there has been relatively little empirical research in this area and there are few practical, well-formulated guidelines for helping system developers and users obtain information requirements. Culmsee and Awati (2012, p. 528) though, state that 'the early stages of projects are often characterised by ambiguity arising from differences in stakeholder views regarding project rationale and objectives' but cite no sources to evidence this. It is also the case that though many authors point to lack of shared understanding as a cause for concern, there are very few studies that provide concrete evidence of this deficiency. Some twenty years later, Lyytinen and co-author Newman (2008) say:

> Information system (IS) change is concerned with generating a deliberate change to an organization's technical and organizational subsystems that deal with information' and that 'describing and explaining the content, scope, drivers, and dynamics of this change has remained contested and challenging.
>
> (Lyytinen and Newman, 2008, p. 589)

The ultimate aim of the research, however, was to provide knowledge that can be used to inform the search for ways to improve the delivery of large projects and increase the quality of the outcomes of those endeavours. As the following two sections show, there is no doubt such improvements are necessary.

1.2 Success rates reported from survey data

A significant amount of research has tried to establish what percentage of projects succeed and exactly how substantial a problem failure is for organisations such as large corporations and government departments. Surveys consistently paint a poor picture of project success rates. For example, a survey of 236 project managers conducted by White and Fortune (2002) found that 41 per cent of their projects were judged to be a complete success but even that proportion was considered a remarkably high success rate compared to those being reported elsewhere at that time. White and Fortune do, however, qualify the success rate by explaining that 46 per cent of the projects were described as giving rise to unexpected side-effects and it should be noted that 14 per cent of the projects that gave rise to unexpected side-effects were among those considered to be a complete success. Another study of project success rates by Sauer and Cuthbertson (2003) looked at four dimensions of project performance: variance against schedule; variance against budget; variance on scope/functionality; and whether the project was abandoned. The results showed that relating to schedule, 3 per cent of projects were completed ahead of schedule, 55 per cent of projects were completed to schedule, and 35 per cent behind schedule. Relating to budget, 15 per cent of projects were completed ahead of budget, 26 per cent of the projects were completed to budget, and 59 per cent over budget. Relating to scope, 5 per cent of projects achieved more than their originally specified scope, 41 per cent of the projects delivered 100 per cent of their planned scope, and 54 per cent under delivered. Finally they report that 9 per cent of projects were reported as abandoned. A 2009 survey of professional IT auditors led Wright and Capps (2010) to suggest that the consensus is that 20 per cent to 30 per cent of all IS development projects are perceived to be overwhelming failures, while 30 per cent to 60 per cent are partial failures. The Standish Chaos report (2009) describes a situation where just 32 per cent of projects succeed in terms of being delivered on time, on budget, and with the required features and functions. The survey on which this report was based covered organisations mostly in the USA (58 per cent) and Europe (24 per cent) and

reported that 44 per cent of projects were challenged (late, over budget and/or with less than the required features and functions) while 24 per cent failed completely (cancelled prior to completion or delivered and never used). It needs to be noted, however, that the methods used to generate the Standish report have been the subject of some criticism. For example, Jørgensen and Moløkken-Østvold (2006) claim the Standish survey may be misleading, highlighting, in particular, the way it reported a 189 per cent average cost overrun of so-called challenged projects, i.e. projects not on time, on cost, and with all specified functionality. They explain that the figure of 189 per cent for cost overruns is probably much too high to represent typical software projects for that time and that a continued use of that figure as a reference point for estimation accuracy may lead to poor decision making and hinder progress in estimation practices. Jørgensen and Moløkken-Østvold (op cit) suggest the following potential reasons to explain the '189 per cent cost overrun' reported in the 1994 CHAOS research report: Non-random sampling of projects (e.g. actively requesting failure stories), Incorrect interpretation of own results (including inconsistent use of actual results), No category for cost underrun, and unusual definition of cost overrun that may include cost of cancelled projects. Interestingly, given they argue the Standish survey may be over-reporting failure, one of Jørgensen and Moløkken-Østvold's most notable conclusions is that the Standish results may foster the erroneous impression that the IT industry has improved strongly since 1994. El Emam and Koru (2008) surveyed IEEE Software's reviewers to illicit their perceptions of the average cancellation rate for software projects. They reported that between 48 per cent and 55 per cent of delivered projects were considered successful, whereas between 17 per cent and 22 per cent were considered unsuccessful. The combined cancellation plus unsuccessful project rate was approximately 26 per cent. El Emam and Koru (op cit) say that the prevailing view that there is a software crisis arose when the Standish Group published its 1994 Chaos report, but suggest that, although the overall project failure rate is high, suggestions that there is a software crisis is exaggerated. Holgeid and Thompson (2013) report that most studies reveal cost overruns in the range of about 30 per cent but

add that it is often difficult to compare studies due to variations in definitions. Conducting a study of IT change initiatives, Flyvbjerg and Budzier (2011) examined 1,471 projects, comparing their budgets and estimated performance benefits with the actual costs and results. They say that the average overrun was 27 per cent—but that one in six of the projects they studied had a cost overrun of 200 per cent, on average, and a schedule over-run of almost 70 per cent. Warkentin *et al.* (2009) report that information systems development projects are a significant expenditure of time, effort and money for many enterprises. In their synthesis of extant research they recount that historically it has been estimated that between 50 and 80 per cent of projects fail to meet their objectives and do so for a variety of reasons. They say that many Chief Executive Officers (CEOs), Chief Information Officers (CIOs) and Information Technology (IT) directors across the world can relate stories of failure and that systems development processes can become 'high profile' when they fail.

With a Prime Ministerial mandate to improve project delivery across UK government by introducing robust assurance measures, the Major Projects Authority (MPA) was established in March 2011 as a partnership between the Cabinet Office and HM Treasury. (A 'major project' is defined by the MPA as any central government funded project or programme that requires HM Treasury approval during its life and/or is of special interest to the Government.) It published its first annual report in 2012 and then followed this up in September 2013 with a second report that examined the status of 191 projects, together worth £350 billion. The projects were classified according to the likelihood of their ability to meet targets relating to time, cost and quality target using the red, amber, green classification shown in Table 1.1 where green indicates that a successful delivery is highly likely and, at the other extreme, red indicates that it is highly unlikely that the project will be successful.

Rating	Description
Green	Successful delivery of the project to time, cost and quality appears highly likely and there are no major outstanding issues that at this stage appear to threaten delivery significantly.
Green/Amber	Successful delivery appears probable; however, constant attention will be needed to ensure risks do not materialise into major issues threatening delivery.
Amber	Successful delivery appears feasible but significant issues already exist, requiring management attention. These appear resolvable at this stage and, if addressed promptly, should not present a cost/schedule overrun.
Amber/Red	Successful delivery of the project is in doubt, with major risks or issues apparent in a number of key areas. Urgent action is needed to ensure these are addressed, and whether resolution is feasible.
Red	Successful delivery of the project appears to be unachievable. There are major issues on project definition, schedule, budget, quality and/or benefits delivery, which at this stage do not appear to be manageable or resolvable. The project may need rescoping and/or its overall viability reassessed

Table 1.1 Red, amber, green classification (Source: The Major Projects Authority Annual Report UK government Cabinet Office., 2013, p.7)

As Table 1.2 shows, just 32 of the 191 projects were assessed as 'green'. Eight were assessed as 'red' and 130 had mixed ratings from green through to red. 21 projects could not be rated because the information needed was not disclosed for commercial sensitivity or national security reasons so they were classified as 'exempt'. It is worth noting that a potential argument that non-disclosure makes departments vulnerable to the perception that they withheld data that was inconvenient to them, was not made in the report, even though it had been specifically mentioned in the previous 2012 publication. The executive director claims in the 2013 report that the MPA's work had already helped to raise successful project outcomes from 30 per cent to 70 per cent. Although the percentage of major project status described in the report as green was around 17 per cent, the executive director emphasised that they were attempting to learn 'their own lessons' in order to improve that success rate. Some commentators (for example, (BBC, 2013)) have expressed surprise regarding the status of the projects. Indeed, Shadow Cabinet Office minister Gareth Thomas was reported as saying: 'The most striking thing is just how many

huge government projects are off track and are at risk of not being delivered, and the sheer scale of public money that's at risk.'

RAG Status	Number of Projects
Green	32
Amber/Green	49
Amber	58
Amber/Red	23
Red	8
'Exempt' (no data submitted for reasons of commercial sensitivity or national security)	21
Total	191

Table 1.2 Major Public Sector Projects UK, RAG status, (Source: Cabinet Office report, 2013, p.32)

1.3 Individual examples of project failure

This section reviews examples of individual projects with the aim of positioning this research in the context of project failure. The academic research of individual projects often paints a disappointing picture of project success. This may of course be because failed projects are more likely to be investigated than successful ones, but even so, the scale of the problems reported is of great concern. It is therefore useful to look at individual instances of project failure, in order to understand the real impact that failure of this magnitude can make on an organisation. The extant literature has been reviewed in order to obtain individual examples of project failure. Glass (1998) provides an example of a public sector project failure in the US. This was the Florida legislature's attempt to create an integrated computer system to help manage the state's 14 separate public assistance programmes. An $85 million contract was awarded to a supplier that delivered a system that was plagued by problems and improperly issued Medicaid cards to 235,000 people. One consequence of the failures is that cards were used inappropriately over a single seven month period to obtain some $28 million of medical services. In another example, Glass (1998) describes the case of the Westpac Corporation of Australia CS90

banking system project. Consultants were employed to define the approach to developing the new banking system and the functionality that it would contain. The Westpac project failed with costs of $150 million and caused, as Glass (pp. 132-137) puts it, 'a fall from first to last place among its competitors in less than four years. They had 'bet the bank' - and lost'. Charette (2005) seeks to find an answer to the question, 'why software fails' and identifies a whole collection of high profile failures in commercial organizations. These include: an Avis Europe PLC [UK] enterprise resource planning (ERP) system project that was cancelled after $54.5 million (Charette measures the cost in US$) had been spent; a Sainsbury PLC Supply-chain management system project that was abandoned after a deployment costing $527 million; a Purchasing system abandoned after deployment costing approximately $400 million at Ford Motor Company; and a Customer relations management (CRM) upgrade that led to revenue losses of $100 million at AT&T.

Goldstein (2005) describes a major project at the FBI to introduce a computerised case management system, called the Virtual Case File system (VCF), that would provide their agents with a much needed tool to combat organised crime. It ended in complete failure at a cost of more than $170 million. In December 2011 the Times newspaper reported that the £12 billion National Health Service (NHS) National Programme for Information Technology (NPfIT) project had become 'Britain's biggest IT procurement fiasco' (Kennedy *et al.*, 2011). In addition to the failure to deliver properly functioning systems, they also reported that the Government may have to pay more to terminate the project than it would have cost, had it been allowed to go ahead.

On the fourth of September 2013 the National Audit Office (2013) released a document that reported on the status of a major UK government programme to introduce 'Universal Credit'. This would have been a significant reform to welfare in the UK and the Department of Work and Pensions (DWP) had planned to spend £2.4 billion on it between

the start and April 2023. The programme spent £425 million up to April 2013 against the planned £431 million. Most spending to September 2013 (£303 million) had been on contracts for designing and developing IT systems. In a stark comment regarding value for money, the NAO (2013) stated that at that early stage of the Universal Credit programme the Department had not achieved value for money. The Department had delayed rolling out Universal Credit to claimants, had weak control of the programme, and had been unable to assess the value of the systems it had spent over £300 million to develop. One of the key findings of the audit was that throughout the programme the Department lacked a detailed view of how Universal Credit is meant to work. The report adds that 'The Department was warned repeatedly about the lack of a detailed 'blueprint', 'architecture' or 'target operating model' for Universal Credit... By mid-2012, this meant that the Department could not agree what security it needed to protect claimant transactions and was unclear about how Universal Credit would integrate with other programmes' (p. 8, para 18).

Reporting on the BBC's Digital Media Initiative (DMI) project, the BBC said in April 2014 that the BBC had ploughed £125.9 million into the scheme – an attempt to create an integrated digital production and archiving system – before it was scrapped by the new incoming Director–General, Tony Hall. A Public Accounts Committee (PAC) investigation into the initiative noted that:

> There were different views amongst those responsible for developing the system and the intended users about the effectiveness of the technology and how engaged business areas were in the programme. The absence of a senior responsible owner to take responsibility for resolving these different views led to a situation where the DMI programme team spent years working on a system that did not meet users' needs.
>
> (House of Commons PAC, 2014, p. 5)

One thing all of these projects have in common is that they all failed despite the availability of project managers and management methodologies and tools. Project management has been in existence as a recognised discipline for some time but is obviously not a guarantee for success.

1.4 Overview of the thesis

Chapter 1 has provided an introduction to this thesis and argued the need for this research and referenced success rates reported using survey data and provided individual examples of project failure.

Chapter 2 contains a literature review that begins with a brief history of project management and description of how project management has developed as a professional discipline over the past decades. There is a discussion regarding project management methodologies and frameworks and a short description of a typical methodology, PRINCE2 . The topic of uncertainty and shared understanding is explored and then critical success factors are examined as part of a discussion on what is commonly recommended in order to maximise the chances of project success. Continuing with the theme of success and failure, the question of why projects fail? is explored. Attention is then given to the risks associated with software development, leading in to a key discussion in the area of shared understanding. Conclusions are then drawn from the literature review, as a close to Chapter 2.

Chapter 3 sets out how the research question was derived, and the subject of ethics for the study defined. It describes the research philosophy and how the approach to research, research method, interviews and data collection was specified, profiles of interviewees, the structure of the analysis and how the research moved toward the interview stage.

Chapter 4 describes how the interviews were carried out and how the initial reference interview was followed up by interviews with the group of project members. It describes the way that interview data from the interviewees facilitated comparison between the PM and the interviewees and comparison between the interviewees themselves, classified by

seniority, sub-project and role. It also describes how an opportunity for a follow up set of interviews presented itself and how responses were recorded for later analysis.

Chapter 5 discusses the implications of the findings in relation to management and organisations, project management methodologies and information systems development (with reference to the relevant literature) and discusses the role of shared understanding in system design and development.

Chapter 6 details the conclusions of the study and describes how it contributes to the body of research in the area of shared understanding and project management.

Chapter 2 Literature Review

As discussed in the previous chapter, there are regular reports in the press and academic literature that highlight the plight of organisations attempting to make a change in the way that they carry out their business activity. These projects may be initiated for a range of reasons but the results are all too often regarded as failures in one way or another, especially where software forms a significant component of the project. This occurs even though project management methodologies are available to private and public sector organisations alike. An obvious, opening question is why should that be the case? There is no lack of project management methodologies or the accompanying consultancy and training services. This chapter looks at the academic and practice-based literature relating to project management. It starts with a review of what is known about why projects succeed and fail and then examines the history of project management and the closely related topic of how project management has developed as a professional discipline over the past decades. This is followed by a discussion regarding project management methodologies and frameworks and a short description of a typical methodology, PRINCE2 . Returning to the theme of success and failure, the question of 'why projects fail?' is explored in more depth. This includes consideration of the risks associated with software development and leads to the exploration of what is known about the key area of shared understanding. The implications for the research are then drawn from the literature review to complete the chapter.

2.1 A brief history of project management

Wideman (2001) points out that the problems of managing projects have existed for a long time but even though engineering technology flourished through the centuries, it was not until the turn of the 20th century that management became the subject of more serious study. In the same paper Wideman chronicles the development of the Project Management Institute, from its beginnings in 1969 until 2001. An invitation to potential members of a CPM (Critical Path Method) association, developed into a meeting where it was agreed to form the Project Management Institute and this body was duly registered by its founder, Jim Snyder, in 1968. Its birth was announced in a news release on October 21, 1969.

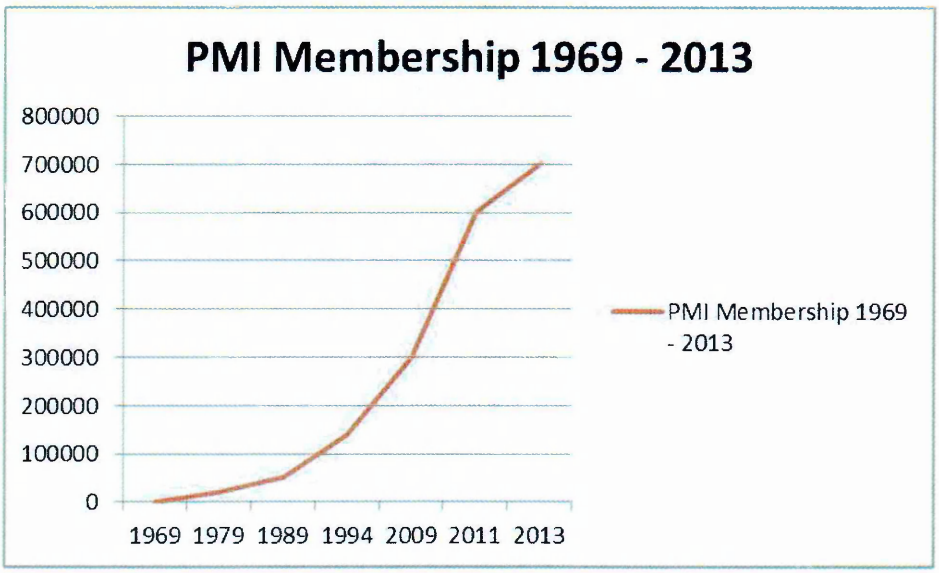
The objectives of the PMI, as set out in that inaugural meeting were to:

1. Foster a recognition of the need for professionalism in project management.
2. Provide a forum for the free exchange of project management problems, solutions, and applications
3. Coordinate industrial and educational research efforts with the objective of directing research efforts towards industrial problem areas.
4. Develop and disseminate common terminology and techniques in an effort to improve communications between users of project management systems.
5. Provide an interface between users and suppliers of both hardware and software systems.
6. Provide guidelines for instruction and education leading to project management implementation and encourage the career opportunities in the field of project management.

(Wideman, 2001, pp. 3-4)

Wideman (op cit) notes a major spurt in growth from 1977 onwards with the introduction of local chapters and further explosive growth due to the application of formalized project management and interest in the IS/IT sector.

The membership has continued to expand since the period reported on by Wideman and in 2013, the PMI website (PMI, 2013) reported that there were more than 700,000 members across more than 180 countries. The Association for Project Management (APM) is an organisation that is committed to developing and promoting project and programme management standards. The APM mission statement is 'To provide leadership to the movement of committed organisations and individuals who share our passion for improving project outcomes' (Association for Project Management (APM), 2013 p. 4). The APM reports a similar trend in growth and reports a membership of more than 20,000 in their 2013 annual report (Association for Project Management (APM), 2013 p. 1). Figure 1 shows the growths in membership of both bodies (and updates Wideman's membership with information taken from the APM annual report 2013) . The growth in PMI membership is particularly remarkable in the light of Wideman's comment that the annual attrition (PMI members choosing to leave the PMI) rate since the mid-eighties has been in the range of 20-30 per cent per year.



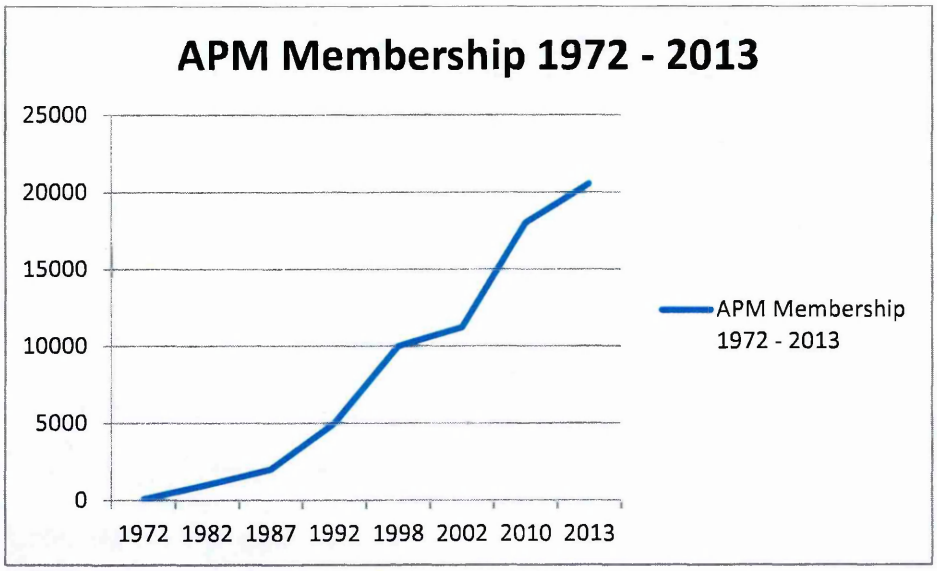


Figure 1: PMI Membership 1969 – 2013 (Wideman, 2001, p.5, and PMI, 2103, p.4) and APM Membership 1972 – 2013 (APM, 2013, p.5)

Morris *et al.* (2006) discuss the formation and development of Project management's professional associations and point out that they were initially set up principally to facilitate the exchange of information, largely via conferences, seminars, journals and magazines. In the mid-1970s, however, PMI, the US based Project Management Institute, and later the APM embarked on programmes to certify that people met their standards of distinctive knowledge. This required a reference work to be available to be used as the basis for the certification tests. PMI established the first version of its Body of Knowledge (BoK) in 1976, although it was not published until 1983. Various other national project management associations produced their own versions, in some cases quite different from PMI's, over the next 10–15 years. Morris *et al.* (op cit) state that the BoK's seem to promote a more mechanistic model, which may be appropriate for more routine or technical situations rather than softer control mechanisms that may be more suitable for less certain scenarios. Two pieces of work allow a timeline to be constructed that highlights the development of project management as a modern discipline. These are: a paper by Archibald (2009) that provides a brief chronology of the development of Project Management; and a paper by Stretton (2007) that details notable project management

milestones though each decade. This timeline is presented in Table 2.1 where excerpts from Stretton's work have been inserted as italic text into Archibald's chronology.

Date	Event
1959-69 (From bar charts to network-based schedules (PERT/CPM))	*Stretton notes that in the 1950's the perceived need to appoint a project manager (whether an individual or an organisation) to take full and undivided responsibility for achieving the project objectives emerged, and that the primary technical development in project management in this period was in network techniques. The 1960's saw the addition of project cost management (and its associated project resource scheduling), to project time management as a distinctive project management technique. Stretton also noted that project management was still primarily identified with the construction, defence and aerospace industries and that the period saw the independent formation of professional project management bodies in Europe and North America.*
1959:	First Kelly and Walker paper on Critical Path Method (CPM) US Navy required Project Evaluation and Review Technique (PERT) from all POLARIS contractors
1969: Oct. 9-10:	PMI's first meeting drew 80 people; the first paper presented there was titled 'Planning, Scheduling, and Controlling the Efforts of knowledge Workers.'
1970-79 First want-ads for project managers appeared	*Stretton notes that the 1970's saw the emergence and/or refinement of a much wider range of tools and techniques, including Work Breakdown Structure (WBS), Organisational Breakdown Structure (OBS) and 'earned value' methods.*
1980-89	First IBM PCs appeared; PM applications proliferated Computer generated network plans produced *In the 1980's and 1990's Stretton notes increased efforts to represent project management as a structured discipline and approach (e.g. PMI's PMBOK)*
1988:	PM certification was launched
2000-09 Virtual project teams and teamwork became common	PMIS became integrated with all major information systems PM education, training, and certification became a huge worldwide business. Many PM certifications: PMI, IPMA, governmental and private IT projects and people dominate PMI membership
2009:	IPMA: National associations in 45 countries - Over 100,000 IPMA certificates have been issued in nearly 50 countries

Table 2.1 Highlights in the history of project management (Source: Archibald, 2009, pp. 1-9 and Stretton, 2007, pp. 1-18)

The combined Archibald and Stretton chronology list is interesting as it hints at the emergence of associated industries that have been spawned from the growing focus on project management as a discipline namely the creation and business management of associations, institutes, training, recruitment, certification and control of standards. In the past decade, certification in particular has become a sizeable industry. Looking at the timeline, there is no obvious link back to a theoretical foundation that has been tested and developed alongside an academic body of work.

Williams says that the roots of 'core knowledge,' as described in the BoKs, lie within Systems Analysis/Systems Management, most famously the work of Cleland. Williams quotes Turner as he points out that it is often said within the project management profession that there is a lack of underlying theory: 'project management lacks a strong theoretical base. Yes, there is an extensive body of knowledge, including many familiar tools and techniques. However, the project management BoK is not based on a series of premises, from which a strong, consistent theory is derived, but more on conjecture... Belief that one approach to managing a project will be better than another is still to a large extent based on faith than sound knowledge' (Williams, 2005, p.500).

If there has been a lack of academic input to the development of project management discourse, perhaps it is now changing. In a relatively recent call for papers Soderlund and Lenfle (2011) lament the lack of historical understanding of the emergence of project management and important landmark projects. They note (p654) that most project management textbooks begin with a short historical section and then turn to the classic description of project management, its organisation and techniques, most of which is disembodied, almost to the extent that no context is taken into account; The tendency is, they argue, to promote a very shallow view on the history of project management. What does the literature tell us about the theoretical foundations upon which project management methodologies are built?

Lenfle and Loch (2010) question the accuracy of the history that is portrayed in text books and suggest the reality may be quite different. A key example they cite is the Manhattan project which was undertaken in the 1940's to develop the atomic bomb. As they point out, 'Modern' project management is 'often said to have begun with the Manhattan Project' (p. 32) and that the Manhattan Project displayed the principles of organization, planning, and direction that typify the modern management of projects' and it 'exhibited the principles of organization, planning, and direction that influenced the development of standard practices for managing projects'. They argue that this characterization of the roots of PM represents a certain irony because the 'Manhattan Project did not even remotely correspond to the 'standard practice' associated with project management today' (p. 32). Indeed, Lenfle and Loch claim that the Manhattan and the projects to develop the first ballistic missile projects Atlas and then Polaris in the 1950's fundamentally violated the phased project life cycle approach whereby projects go through phases, each of which has an outcome and end-review that triggers a decision about whether to start the next phase. Instead, they applied a combination of trial-and-error and parallel trials in order to 'push the envelope' and allow them to achieve outcomes considered impossible at the outset.

Interestingly, Whitty and Schulz (2007) suggest that it is too simplistic to compare the origins of project management (which is traditionally considered to be deeply rooted in antiquity) with its present day methodology (borne out of the construction and military weapons industries). They suggest that project management has been directly influenced by Puritanism (a doctrine of 'one true way'), via liberalism, Taylorism, and Newtonianism. Weaver (op cit) discusses pre classical developments and suggests that the genesis of the ideas that led to the development of modern project management can arguably be traced back to the protestant reformation of the 15th century.

Weaver says that the Protestants and later the Puritans introduced a number of ideas including 'reductionism', 'individualism' and the 'protestant work ethic' that resonate strongly in the spirit of modern project management and that in relation to the evolution of

modern project management, these ideas were then incorporated into two key philosophies, Liberalism and Newtonianism. Liberalism included the ideas of capitalism (Adam Smith), the division of labour, and that an industrious lifestyle would lead to wealthy societies based on the concept that 'self-interest' is tempered by the influence of an 'invisible hand' that directs this 'selfish interest' to the benefit of society as a whole. Coining the phrase, 'an invisible hand' may have been an attempt to describe factors that were not well understood at that time, and it may be that in the context of project management, may not be better understood even today.

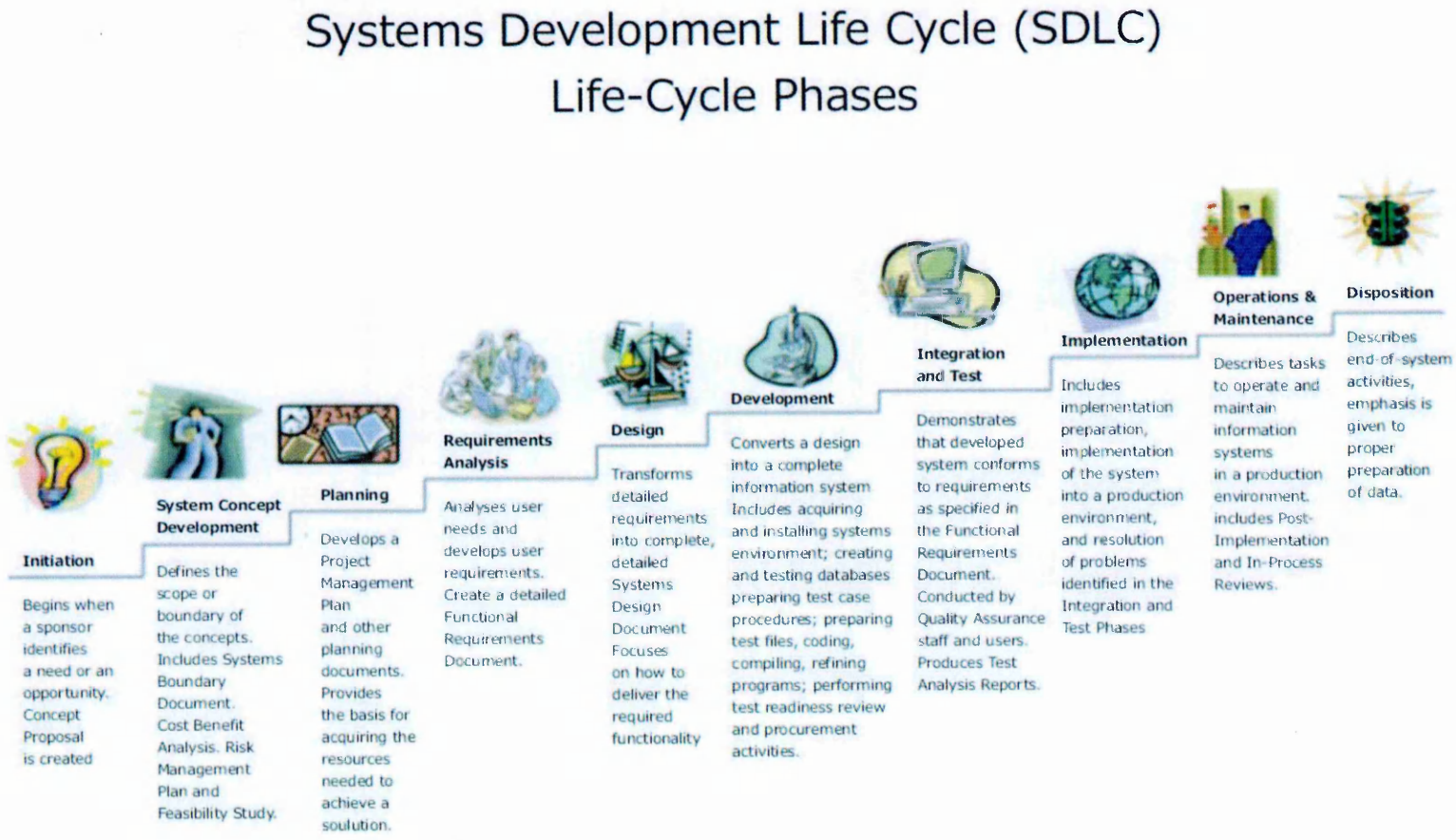
2.2 Project management methodologies and frameworks

Whatever the truth of the history that is commonly espoused it is the case that a substantial amount of work has been undertaken over the last three decades to develop project management methods and frameworks. These will be looked at next though it is worth noting Truex *et al.*'s (2000) view of them. Truex *et al.* say that

> Methods for the building of information systems are clearly important elements in the information systems discipline. Yet there are gnawing problems about their practicability. Methods are often unsuitable for some individuals and settings. Similar methods in similar settings yield distinctly different results. Developers may claim adherence to one method while ignoring this method in actual practice. While development methods research has essentially reified methods, it offers little fundamental understanding of what it means to be methodical and how methods are actually applied in the field.
>
> (Truex *et al.* 2000, p. 54)

Project management methodologies have developed from the (early 1970's) Systems Development Life Cycle (SDLC) approach through to contemporary Agile project management techniques. SDLC is a waterfall type methodology and contains a number of stages – typically an exploration or definition stage, design stage, development stage, integration and test stage, and implementation stage, then an operations stage (which will include or lead to system maintenance and final 'end-game' disposal). The US Department of Justice (2003) provide a diagram, reproduced here as Figure 2, to illustrate the step by step SDLC process. The SDLC approach clearly expects a stage to complete before moving on to the next stage.

Figure 2: SDLC method, US Department of Justice 2003 (http://tinyurl.com/h72paeq)



Although the SDLC method can claim to be one of the earliest approaches to the development of software it is only one of a range of others that are available. Charvat (2003) describes and compares a number of project management frameworks and Project development methodologies that can be used on their own or in conjunction with a project framework. The project management frameworks discussed by Charvat include Waterfall, SDLC, Rational Unified Process (RUP) and Projects in Controlled Environments 2 (PRINCE2). His comparison between these four is shown in Table 2.2. The project development methodologies looked at include: Extreme Programming (XP)-extreme, Object Oriented (OO), Rapid Application Development (RAD) and Prototyping. Their characteristics are shown in Table 2.3.

Methodology / life cycle	Risk	Ease to implement	Resource Intensive	Frequent Changes	Easy to manage	Scope Creep	Reliability	Document Oriented	Project Approach
Waterfall	L	Easy	M	X	√	√	√	√	Phased
SDLC	M	Average	M	√	√	√	√	√	Phased
RUP	M	Difficult	L	√	X	√	√	√	Phased
PRINCE2	M	Easy	M	X	√	√	√	√	Phased

Table 2.2 Comparison of Project Management Frameworks (Source: Charvat, 2003, p. 65)

Methodology /life cycle	Risk	Ease to implement	Resource Intensive	Frequent Changes	Easy to manage	Scope Creep	Reliability	Document Oriented	Project Approach
XP – extreme	M	High (sic)	M	√	√	√	√	X	Iterative
Object Oriented (OO)	H	Difficult	H	√	X	√	√	X	Iterative
RAD	L	Easy	L	√	√	X	√	X	Phased
Prototyping	L	Easy	L	√	X	√	√	√	Phased

Table 2.3 Project Development Methodologies (Source: Charvat, 2003, p. 97)

Taken together, Tables 2.2 and 2.3 show a wide range of methodologies that may be utilised in the creation and implementation of systems where software forms a significant part of the solution. They also show that each method has characteristics that make it more or less suitable for certain types of project. For example, looking at Charvat's comparison, the waterfall and PRINCE2 methods do not appear to lend themselves to frequently changing requirements. It is also indicated that RAD has some difficulty with scope creep but the others less so and that OO is more difficult to implement than the others. When identifying other practices, other authors identify a shorter list. Chin *et al.* (2010) for example identify just five:

1. Project Management Body of Knowledge (PMBOK)
2. Projects in Controlled Environments (PRINCE2)
3. Association of Project Management Body of Knowledge (APMBOK)
4. International Project Management Association (IPMA)
5. British Standards (BSI) BS6079

They then go on (pp. 6112) to look at the merits and drawbacks of each as follows:

PMBOK

PMBOK is considered (at least the current version) to be both a comprehensive and well-structured approach to the management of projects which can be applied regardless of the scale or nature of the project. PMBOK does not include any template or checklist needed to construct a project plan. It has been argued that the processes are rather bureaucratic and may hinder the creativity of the project manager.

PRINCE2

PRINCE2 is a structured methodology which provides organizations with a standard approach to the management of project. PRINCE2 provides a controlled start, middle and end to projects and includes regular reviews of project progress. PRINCE2 asserts that it is suitable for any project size, but PRINCE2 is also viewed by some as cumbersome, regimented or bureaucratic. Although it is utilised for managing complex projects in the areas of business change, business performance improvement, system development/implementation and product development, its structured approach is sometimes considered to limit the organization's flexibility in coping with a changing environment.

APMBoK

Based on competency assessment via exams and certifications, APMbok is not as flexible as PMI's PMBOK. It is also clearly stated that it is not a set of competencies but comprises of a general competency framework for use in organizations. APMBOK has been referred to as a more proper set of practices commonly adopted to govern projects and its emphasis in the management of people (soft skills) rather than being manager-focused.

IPMA

IPMA has incorporated a framework from an international network of project management societies aiming to provide a holistic model for project and programme managers. It seeks to identify what skills and abilities are needed to service challenges in specific project environments. In comparison with the PMI, the IPMA competence baseline is merely an extended focus on project management by including programme management, as well as business, organization and behavioural aspects.

BSI

In the UK, BSI, an independent chartered body responsible for preparing British Standards in 1996 published BS6079-1:2002. Viewed as less comprehensive than PMI's PMBOK guide it is lighter and not as extensive concentrating on the knowledge areas of project management and aims

> to guide general managers to enable them to provide appropriate support for project managers and their teams; for project managers' to improve their ability to cope; for project support staff to help them understand the problems that may occur and to help provide possible solutions and finally for educators and trainers to help them understand the industrial context in which project management techniques are used.
>
> (Chin *et al.*, 2010, pp6-12)

Wideman (2003) carries out a comparison of PMBOK and PRINCE2 and notes that PRINCE2 and the PMBOK guide take very different approaches to their material. He goes on to discuss these differences at length. Amongst other things he notes:

> The PRINCE2 project life cycle does not start with original need, solution generating and feasibility studies – these are considered as inputs to the project life cycle, perhaps as separate projects in their own right. For example, PRINCE2 describes a product's life span as having five phases: Conception, Feasibility, Implementation (or realization), Operation and Termination but, of these, only Implementation is covered by PRINCE2.
>
> (Wideman, 2003, p.3)

and,

> Within its self-prescribed limitations, PRINCE2 provides a robust easy-to-follow methodology for running most projects, that is, where the objectives are clear and the deliverables are either well described, or capable of being so.
>
> (Wideman, 2003, p. 8)

In the next subsection the features of PRINCE2 will be examined in detail as an illustration of how such methodologies compose themselves, make techniques available to the project, and provide processes for stakeholders to follow. PRINCE2 has been selected because it is a common, open, UK standard and use of the PRINCE2 method does not require a licence from the UK Cabinet Office. This has some advantages as it makes it easier to obtain and review documentation and get access to supporting information on the PRINCE2 website.

The key features of PRINCE2

PRINCE2 was initially developed to support UK government information systems projects and is a non-proprietary, structured project management method. Prince, the original version of the method was introduced in the early 1970s when industry was beginning to introduce large-scale administrative computer-based systems but the introduction of IT systems into organisations was not well understood. Prince sought to reduce both the cost of carrying out projects by using standard methods and the chance of technical failure by basing the approach on current best practice. PRINCE2, which differed significantly from Prince, was published in 2005. The version in current use appeared in 2009 (OGC, 2009). It is published in two volumes:

1. *Managing Successful Projects with PRINCE2* - for people who work on projects
2. *Directing Successful Projects with PRINCE2* - for people who lead or sponsor a project.

The publisher of PRINCE2 (OGC, 2009) claims that it 'has emerged as one of the most widely accepted methods for managing projects' (p. 4). Some caution may be appropriate

here as research indicates that this claim may not be strictly true. For example, a survey conducted by Fortune *et al.* (2011) to investigate the real world experiences of people involved in project management in Australia, Canada and the UK found that while PRINCE2 was used very widely in the UK, it was used to a much more limited extent in Australia and not at all in Canada. Fortune *et al.* say that 'It is not surprising that PRINCE2 qualifications are more prevalent in the UK given the approach originated there but it is interesting that whilst it is making inroads into Australia it has not migrated to Canada and nor does it have any direct equivalent there' (p. 557).

The PRINCE2 manual (OGC, 2009) defines a project as 'a temporary organisation that is created for the purpose of delivering one or more business products according to an agreed business case' (p. 31) and suggests, in response to the question 'why have a project management method?' that the purpose of project management is 'to keep control over the specialist work required to create the project's products' (p. 4). The methodology has four integrated elements:

1. Principles
2. Themes
3. Processes
4. Project environment

It also has seven principles that cut across three of these four elements, as shown in Table 2.4. The principles are guiding obligations and good practices whereas themes are aspects of project management that must be addressed throughout the project, processes are a step-wise progression through the project lifecycle and tailoring is a method to modify the methodology to suit projects of different scale and complexity. The purpose of each of the seven processes is explained in Table 2.4. It is interesting to note that the official PRINCE2 manual (OGC, 2009) is very firmly of the view that unless all seven principles are applied 'it is not a PRINCE2 project' (p. 5).

	Principles	Themes	Process (and process purpose)
1	Continued business justification	Business case	Starting up a project - The purpose of the Starting up a Project process is to ensure that the prerequisites for initiating a project are in place by answering the question: do we have a viable and worthwhile project? (PRINCE2 2009, p. 121)
2	Learn from experience	Organization	Directing a project - The purpose of the Directing a Project process is to enable the Project Board to be accountable for the project's success by making key decisions and exercising overall control while delegating the day to day project management to the project manager. (PRINCE2 2009, p. 135)
3	Defined roles and responsibilities	Quality	Initiating a project - The purpose of the Initiating a Project process is to establish solid foundations for the project, enabling the organisation to understand the work that needs to be done to deliver the project's products before committing to a significant spend. (PRINCE2 2009, p. 149)
4	Manage by stages	Plans	Controlling a stage - The purpose of the Controlling a Stage process is to assign work to be done, monitoring such work, deal with issues, report progress to the project board and take corrective actions to ensure that the stage remains within tolerance. (PRINCE2 2009, p. 167).
5	Manage by exception	Risk	Managing product delivery - The purpose of the Managing Product Delivery process is to control the link between the project manager and the team manager(s) by placing formal requirements on accepting, executing and delivering project work. PRINCE2 2009, p. 185.
6	Focus on [the definition and delivery of] products	Change	Managing a Stage Boundary - The purpose of the Managing a Stage Boundary process is to enable the project board to be provided with sufficient information by the project manager so that it can review the success of the current stage, approve the next stage plan, review the updated project plan, and confirm continued business justification and acceptability of the risks. (PRINCE2 2009, p. 193)
7	Tailor to suit the project environment	Progress	Closing a project - The purpose of the Closing a Project process is to provide a fixed point at which the acceptance for the project product is confirmed. (PRINCE2 2009, p. 205).

Table 2.4 The principles, themes and processes of PRINCE2 (Source: OGC, 2009, pp.9-18)

PRINCE2 (OGC, 2009 p. 4) claims that the method is generic and 'can be applied to any project regardless of project scale, type, organisation, geography or culture' but at the same time the PRINCE2 manual addresses the need to tailor it to the specific context in a chapter entitled Tailoring PRINCE2 to the project environment, (pp. 215 - 231). It points out it is not a 'one size fits all' solution but a flexible framework that can readily be tailored to any type or size of project (p. 215). It is difficult to find specific references to the 'cutting down' of PRINCE2 in the academic literature, but there are regular references to this in the 'grey' literature. Bentley (2009) describes how roles can be combined, product descriptions may be modified, programme standards can be used in place of project standards and processes can be combined providing there is due regard to the risks and requirements associated with doing so (pp. 241 – 244). Waveney District Council and Suffolk Coastal District Council (2014) for example, have adopted a joint project management framework including templates and guidance, based on a cut-down version of PRINCE2 . A book entitled *Tailoring PRINCE2* that was published by OGC in 2002 provides a mix of advice, starting by saying that the methodology can be scaled up or down and that scaling up is a straight forward process of applying everything that can be found in the manual. The book implies that scaling down is less straightforward and proceeds to describe examples of how PRINCE2 can be integrated and implemented. It is notable that the Tailoring PRINCE2 book says that 'advice given in one section may conflict with advice given in another because it applies to different circumstances... consequently it would be wrong to quote the book as an authority for acting in one way or another regardless of the circumstances' (p. 4) and that 'experience of the team will have an impact on the approach that is taken' (p.5). Although it is not the focus of this research to seek to define the difference between 'cut down PRINCE2 ' and 'tailored PRINCE2' there is a question as to how realistic it might be to assume that different people will apply the PRINCE2 methodology in an appropriate way, or in a consistent manner in similar circumstances.

PRINCE2 (2009 pp. 6-7) says that its generic capacity means that it cannot cover every aspect of project management. In particular, there are three broad topic areas it considers to be outside of the scope of PRINCE2 and therefore not included. These are: specialist aspects; engineering models; and project lifecycles or specific techniques (such as those for change management or procurement). PRINCE2 also says that it does not attempt to codify attributes such as leadership capability in the method as it believes it impossible to do so because leadership styles vary considerably and a style that works in one situation may be completely inappropriate in another. This is notable as the Tailoring PRINCE2 book (op cit) explains that the adoption and configuration of PRINCE2 depends on differing experience and the context of the project yet PRINCE2 does not even offer at least a comparison of the management styles that could influence the way that PRINCE2 is 'tailored'.

It is difficult to find much in the way of explicit criticism of PRINCE2 in the literature but some researchers have implied weaknesses in PRINCE2 by declaring that differing approaches offer solutions to the problems associated with project management. Tomanek and Juricek (2015) for example say that the following problems in the use of PRINCE2 are addressed by the use of Agile: scope change as a result of external changes; scope change as a result of poor or insufficient initial planning; different project outputs; a lack of top management support; budget deficit and optimistic expectations.

Some of the less formal web log articles discuss PRINCE2 and Agile techniques. Buehring (2015) asks 'What's the difference between PRINCE2 and Scrum?' and comments that PRINCE2 is a predictive (plan-based) approach, while Agile calls for short-term, incremental achievements independent of an over-arching plan. He suggests that there are clear advantages to the Scrum framework, which allows greater freedom to team members, thereby encouraging greater personal investment in the project. Another point he notes is the way that changes are managed in PRINCE2 and Agile; in the former the changes are managed through the change control process. In the latter the developers are expecting change and are empowered to respond directly throughout the

project, providing, as the name suggests, a more responsive approach. Another web log article by Lonergan (2015) describes a number of perceived PRINCE2 deficits including: poor cost and financial management, a lack of guidance on delivery, a lack of daily interaction with project executives and a limited requirement to highlight issues to others for resolution or decision making. Wells identifies some drawbacks relating to project management methodologies such as PRINCE, noting that since 1999 project management methodologies have been placed as one of the top ten contributing factors toward project failure, and have even been described as a 'fetish used with pathological rigidity for its own sake' (Wells, 2012, p. 45).

At this juncture it is appropriate to explore the meaning of the term 'shared understanding'. The next section looks at the definition of shared understanding in the context of information systems projects.

2.3 Uncertainty and shared understanding

Earlier sections have shown the ambiguity and complexity of projects and how project management methods try to create some order to them. The projects and the methods described depend upon people working in teams and that too brings further complexity and ambiguity.

He (2007) observes that modern organizations are increasingly adopting the team approach as a way of accomplishing tasks that surpass the capabilities of single individuals and software project teams are an important example of this trend. Teams are viewed as 'group(s) of two or more individuals who must interact cooperatively and adaptively in pursuit of shared valued objectives'. Software projects, they say,

> are typically complex, dynamic, and involve unstructured tasks and execution of these projects requires knowledge and expertise from many domains. However, the mere presence of individuals with diverse knowledge is an insufficient condition for a software project team to achieve quality performance and the potential value of a team can only be realized if team members utilize their unique expertise in conjunction with the knowledge of other members.
>
> (He 2007, p.262)

It appears that assembling a team with the best skills available will not be enough in order to maximise the probability of success.

Williams also notes that business is becoming increasingly projectized and global spending on projects is now many billions of dollars annually (Williams, 2005, p. 497). He also says that goal uncertainty is lacking in the conventional project management discourse, which assumes that there is a clear, unambiguous project goal. But, quoting Linehan and Kavanagh he says that : 'Projects are complex, ambiguous, confusing phenomena, wherein the idea of a single, clear goal is at odds with the reality' and

Engwall talks about 'the futile dream of the perfect goal,' saying that the idea of a clear exogenously defined goal derives from the philosophical origins of project management and is inapplicable for non repetitive projects, describing project execution as 'a process of goal formation'. (Williams, 2005, p. 502). The creation of shared understanding, as Braunschweig and Seaman note, whether it be in the context of software development or the development of other outcomes (such as business initiatives or organisational change) developing shared understanding is a complex cognitive process that is poorly understood and difficult to investigate (Braunschweig and Seaman, 2014, p.1). Espinosa *et al.* reflect this view as they too note that there is very little agreement or consistency in the literature about how to measure shared cognition (Espinosa *et al.*, 2004, p. 124).

As difficult as it may be to define shared understanding, some commentators have attempted to describe and define this important concept. Without quite defining the term shared understanding, Curtis *et al.* (1988) nevertheless say that developing large software systems must be treated, at least in part, as a learning, communication, and negotiation process and a prerequisite for the discussion and definition of how to best proceed towards a future state is a shared understanding of what that future state is and how it will appear to the observer. Aranda (2010) attempts to address the problem of achieving effective coordination and communication dynamics in software organisations and develops a 'theory of shared understanding' shown in Figure 3.

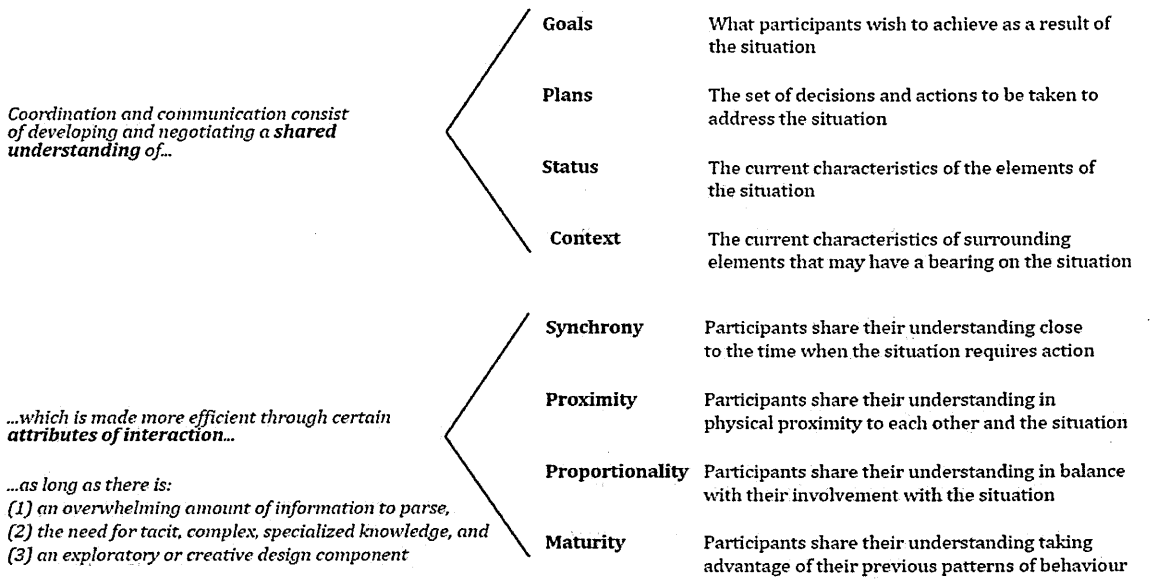


Figure 3: Theory of shared understanding, (Aranda, 2010, p101)

Note that Aranda identifies goals, plans, status and context as areas that are important inclusions in the creation of a shared understanding. He also says that certain attributes of interaction will make the establishment of shared understanding more efficient, i.e. synchrony, proximity, proportionality and maturity. Aranda identifies these factors in the setting of a need for tacit, complex, specialised knowledge.

Gibson and Cohen (2003, p. 12) define shared understanding as 'the degree of cognitive overlap and commonality in beliefs, expectations and perceptions about goals, processes, tasks and members' knowledge, skills and abilities'. Hinds and Weisband (2003, p. 23) adopt a view based on the advantages related to possessing shared understanding and identify the benefits as:

- Enables people to predict the behaviours of team members
- Facilitates the efficient use of resources and effort
- Reduces implementation problems and errors
- Increases satisfaction and motivation of team members
- Reduces frustration and conflict amongst team members

In their discussion of shared understanding, (Charaf *et al.*, 2013) tell us that successful knowledge transfer, mutual understanding and communication are major factors that affect information systems development success - bridging the 'communication gap' between users and developers is something that will help to deliver a successful system. Similarly, Fahey and Prusak (1998) say that it is an error not to recognise that a fundamental intermediate purpose of managing knowledge is to create shared context. They go on to point out that shared context means a shared understanding of an organization's external and internal worlds and how these worlds are connected before emphasising that 'shared context is dynamic: ...any shared understanding is likely to change over time, and sometimes may do so suddenly'.

Creating a shared context may be dependent on the characteristics of the people involved. Siau *et al.* (2010) examine cognitive styles and define them as characteristic modes of functioning that people show throughout their perceptive and intellectual activities in a highly consistent and pervasive way. Each individual person has a view of the world around them that is heavily influenced by their own cognitive and personal factors and when an individual reads a document or receives a message from another human being, whatever the message is, it is made subject to an interpretation on the part of the individual that is led by that persons 'cognitive filter'.

Of course, the problems of creating shared understanding amongst various stakeholders are not limited to the design and execution of information systems. For example, Aarseth *et al.* (2012) consider problems created by a lack of shared understanding when implementing a partnering approach in construction projects. And in the context of design more generally, Arias *et al.* (2000) note that because complex problems require more knowledge and expertise than any single person possesses, it becomes increasingly necessary for all involved stakeholders to participate, communicate, and collaborate with

each other and that project complexity and associated specialisation requires large and heterogeneous groups to work together on projects over long periods of time.

Returning to the world of information systems, it is clear that the people involved in systems projects must communicate and reach shared understanding if a successful system is to be created. Braunschweig and Seaman (2014) note that

> software engineering teams 'must have a shared understanding of the system design in order to work independently but integrate their code' and that 'when team members share knowledge, there are differences in understanding or interpretation of that knowledge'.
>
> (Braunschweig and Seaman, 2014, p.1)

In their conclusion they also describe the outcome of a lack of shared understanding, narrowing in on software delivery related problems, namely software integration failures, unexpected software performance, and/or unsatisfied requirements. It is important then, to consider the meaning of shared understanding and how good or poor understanding might affect project outcomes. Gibson and Cohen draw out cognitive and softer aspects, defining shared understanding as:

> The degree of cognitive overlap and commonality in beliefs, expectations and perceptions about a given target.
>
> (Gibson and Cohen, 2003, p. 8)

They also summarise the benefits of shared understanding among team members, and interestingly mention that team satisfaction and frustration are important factors:

- Enables people to predict the behaviours of team members

- Facilitates efficient use of resources and effort
- Reduces implementation problems and errors
- Increases satisfaction and motivation of team members
- Reduces frustration and conflict among team members

(Gibson and Cohen, 2003, p.23)

They also note that:

> A number of factors contribute to shared understanding, including having similar backgrounds, having a base of shared experiences, having the opportunity to learn about each other over time, communicating and sharing information, and developing a team spirit.
>
> (Gibson and Cohen, 2003, p.24)

Espinosa, J.A. *et al.* consider shared understanding to be commonly understood as a means of implicit coordination within a team. Unlike explicit coordination mechanisms, such as plans and specifications, implicit coordination describes team members' ability to anticipate each other's needs and actions and behave in a coordinated fashion without these explicit mechanisms (Espinosa J.A. et.al, 2004, p. 107-129).

Implicit communication must rely on the individual's capacity to create a personal, valid interpretation of the information provided to them. Lewis (1934) discusses experience and meaning and suggests that:

> When knowledge is envisaged, as it must be, from within the egocentric predicament, all objects known or conceived must reveal themselves as constructions, eventually, from data given in first-person experience. Also, what

> enters into such construction from past experience can only come in by way of present recollection.
>
> (Lewis, 1934, p. 129)

He adds that:

> Distinctions such as that between real and imaginary, or between that which is apprehensible to me alone and the object apprehended by us in common, must nevertheless find their genuine place and importance in such construction. The fact that we make these distinctions in practically useful ways evidences that they are not outside the egocentric predicament and metaphysical but inside it and empirical. They are determined by criteria which the subject can and does apply within his own experience.
>
> (Lewis, 1934, p. 130)

If Lewis is describing mental constructions, then perhaps some more recent research may point towards a useful definition. Cooke *et al.* explain that the knowledge possessed by effective teams has been frequently referred to as shared knowledge and in similar contexts as shared mental models, shared cognition and shared understanding. Whichever term is preferred, Cooke *et al.* state that such knowledge sharing is thought to help teams coordinate implicitly when explicit communications are hampered, thereby enhancing team performance and that shared mental models provide mutual expectations that allow teams to coordinate and make predictions about the behaviour and needs of their teammates (Cooke *et al.*, 2000, p. 151). Johnson and O'Connor suggest that a strong indicator of effective team performance may be team cognition – the degree to which members of a team share similar conceptualizations of problems and approaches to solutions (Johnson and O'Connor, 2008, p. 114). Describing a shared mental model (SMM), (also known as shared understanding), as an external representation of a problem or an aspect of a problem that is co-developed or accepted by a group of individuals

working toward a common goal, they go on to say that the acquisition of a SMM improves team performance. Team mental models (TMMs) are the subject of review in a paper (Mohammed *et al.*, 2010, p. 876-910) that revisits the concept fifteen years after it had first been introduced by Cannon-Bowers and Salas (1990). The notion of a team mental model (TMM) was introduced as a way to capture the implicit coordination frequently observed in effective teams and to further understand how teams operate in contexts that are complex, dynamic, and uncertain. They conclude that the concept has developed but there is much research still to be done as mixed and contradictory findings have plagued research examining TMM accuracy, TMM stability, and the interactive effects of TMM accuracy and similarity (Mohammed S. *et al.*, 2010, p. 902). DeChurch *et al.* echo that sentiment as they say that although shared team mental models were identified as important drivers of team effectiveness over 15 years ago (Cannon-Bowers *et al.*, 1993), the complexity involved in capturing this collective cognitive construct has prompted researchers to use a variety of different measurement approaches. This variation in methodology poses a challenge to the aggregate interpretation of findings. Future research on shared team mental models would be well served to utilize methods than enable structure to be captured (DeChurch and Mesmer-Magnus, 2010, p. 10).
Vickers (1973) asserts that an individual's appreciative system will determine how he or she sees and values various situations and hence how he or she makes 'instrumental judgements' and takes 'executive action' – in other words, how he or she contributes to the construction of the social world. It follows, according to Vickers, that if human systems are to achieve stability and effectiveness, then the appreciative systems of their participants need to be sufficiently shared to allow mutual expectations to be met and that human systems depend upon shared understandings and shared cultures. This leads, however, to the question 'What is the context for this understanding in IS?'

Hirschheim and Klein (1989) offer and describe four paradigms of information systems development: functionalist, social relativist, radical structuralist and neohumanist. They

then go on to provide four corresponding generic story types: analyst as *systems expert*; analyst as *facilitator;* analyst as *labour partisan;* and analyst as *emancipator or social therapist.* The functionalist paradigm (analyst as *systems expert*) suggests that:

> All information systems are designed to contribute to specific ends and that management is the leadership group that knows or develops the ends that are then translated and specified in terms of system objectives. ... [The plot (the 'why' of the story) is] the ideal of profit maximization and [the assumption is one which is defined by Burrell and Morgan as] an overall approach which seeks to provide essentially rational explanations of social affairs.
>
> (Hirschheim and Klein, 1989, p. 1203)

The social relativist paradigm (analyst as *facilitator*) suggests that:

> There is no single reality, only different perceptions about it. Business does not deal with an objective economic reality, but one that evolves through changing traditions-social laws, conventions, cultural norms, and attitudes. Management, too, tries to make sense of the confusion and instil others with a commitment to the organizational mission that is constantly evolving. IS are part of the continually changing social environment and somehow should help to identify which ends are desirable and feasible. ... [The plot is]: As the social environment is under continuous evolution, no particular rational explanations can be provided to 'explain' organizational reality and [the assumption is] the epistemology is that of anti-positivism reflecting the belief that the search for causal, empirical explanations for social phenomena is misguided and should be replaced by sense-making. The ontology is that of nominalism in that reality is not a given, immutable out there, but is socially constructed. It is the product of the human mind.
>
> (Hirschheim and Klein, 1989, pp. 1204-1205)

The radical structuralist paradigm (analyst as *labour partisan*) suggests that:

> Systems development intervenes in the conflict between social classes for prestige, power and resources. Conflict is seen as endemic to society and generally follows a predictable pattern that can be discerned by analysing vested social interests and the structures and relationship supporting them. ...[The plot involves] the evolution from slavery through feudalism and capital market economy to a collectively planned and managed economy and [the assumption is] the epistemology is that of positivism in the specific form of a materialist view of history and society. The ontology is that of realism reflecting the belief in a pre-existing empirical reality. The paradigm is that of radical structuralism reflecting a critique of the status quo with the aim of providing the rationale for radical change.
>
> (Hirschheim and Klein, 1989, p. 1207)

The neohumanist (analyst as *emancipator or social therapist*) suggests that:

> Information systems are developed to remove distorting influences and other barriers to rational discourse. Systems development is governed by the three knowledge interests. The technical knowledge interest directs the developer to be sensitive to issues associated with effective and efficient management of the system project. The interest in mutual understanding directs the developer to apply the principles of hermeneutics, which examine the rules of language use and other practices by which we improve comprehensibility and mutual understanding, remove misunderstandings, and disagreement or other obstacles to human communication. The knowledge interest in emancipation directs the developer to structure systems development to reflect the principles of rational discourse. ...[The plot centres on] the ideal of emancipation. Information systems should lead to an emancipation from all unwarranted constraints and compulsions (e.g.,

> psychological, physical, and social) toward a state of justice, freedom, and material well-being for all. [The assumption is] that the epistemology adopted in this story is of two types: positivism for knowledge interests in technical control (which includes both nature and man); and anti-positivism for knowledge interests in mutual understanding and emancipation. The ontology adopted is also of two types: realism for technical interests and nominalism or social constructivism for mutual understanding and emancipation of interests. The adopted paradigm is that of neohumanism which reflects the desire to improve the existence of organizational actors (through their emancipation) by developing information.
>
> (Hirschheim and Klein, 1989, p. 1209)

It is interesting to note that mutual understanding is drawn out as an important feature of the neohumanist story type along with shared understanding as an important part of the emancipatory knowledge interest. It might be argued that all four paradigms rely implicitly on a clear understanding of the end state in any of the story types.

Perhaps an insight in to the personalities of project staff might shed some light on obtaining a shared understanding? White (1984) carried out research in to the systems development activities of two MIS project teams to try to assess whether there was a link between the personality characteristics (as measured by the Myers-Briggs Type indicator[1]) of the members of the project teams and team performance. She found that:

> The analysis indicated a void of certain personality styles in project team one. This void correlated with weaknesses ascertained from the interview data for

[1] Bloomsbury (2007) define the Myers-Briggs type indicator is a psychometric test that identifies four basic preferences in people's behaviour. The indicator was created in the 1940s by Katherine Cook Briggs and her daughter Isabel Briggs-Myers. It is based largely on the Jungian theory of personality types. The four preferences identified are made up of pairs of opposites: extraversion and introversion; sensing and intuition; thinking and feeling; and judgment and perception. The indicator provides a framework allowing people to understand themselves and others more fully, as well as encouraging the appreciation of different styles and perceptions. It is often used in team building and in the recruitment process.

project team one. Project team two, with all four personality styles represented, was evaluated as very successful.

(White, 1984, p. 95)

White also suggests that:

> The perceptual component of project teams is of a significant enough nature that it should be carefully assessed and that human and social factors are important.
>
> (White, 1984, p. 99)

A slightly earlier article looking at personality characteristics of MIS project teams (Kaiser and Bostrom, 1982) had also used the Myers Briggs type indicator. Theirs was a two phase study that began by looking at the personality characteristics members of design teams across 32 large organizations before undertaking a detailed examination of system success and failure in one organization. A focus of their analysis was to examine whether there were significant differences on personality dimensions between users and systems personnel and discover what the relationship was between these differences and system success. As they said in their paper:

> It is often hypothesized that systems personnel and users are different in terms of personality and behaviour characteristics and that these differences are one of the primary reasons for the existence of a communication gap.
>
> (Kaiser and Bostrom, 1982, p. 43)

They interpreted their results as indicating:

> ... that user representatives on project teams are very similar to their systems counterparts on the Jungian personality dimensions. Even more surprising was

> that these user representatives are closer to popular descriptions (ST personality type) of systems staff than the analysts are. The data indicate a plausible explanation. It appears that these user representatives are not the actual end users of the systems and are different in personality characteristics from these end users. These findings imply that organizations are shifting the communication gap from the user representative and system person to the user representative and end user. This strategy leads to a more harmonious design process but a high probability of implementation problems.
>
> (Kaiser and Bostrom, 1982, p. 56)

It might be important for the people involved in projects to have a similar background or level of experience so that they work together more effectively. Charaf *et al.* (2013) discuss shared understanding and point out that:

> Regardless of the methodology used, *requirements development* as 'the elicitation, analysis, specification, and validation' of stakeholder requirements that are to be met by software-intensive information technology (IT) systems plays a central role ISD fails not because IT systems are technically deficient but because they poorly correspond to the needs and requirements of the underlying business domain.
>
> (Charaf *et al.,* 2013 p. 116)

They go on to add that:

> One of the key success factors relates to bridging the so-called 'communication gap' between users and developers, who are characterised by different cultures, communities and jargons.
>
> (Charaf *et al.,* 2013 p. 117)

It may be that cultural factors may play a part, whether they be organisational or personal in nature. In a paper that describes a four-month case study that observed the collaboration patterns of a multi-site development project team, Damian *et al.* inspected project documentation, interviewed team leaders, attended project meetings, and spoke with developers to identify problems originated by the lack of awareness of changes related to the implementation of work items. They note that awareness needs are at least partly determined by organizational culture and that because different sites may have their own organizational cultures, one challenge is to build an awareness mechanism that can handle differences in organizational culture and process across distributed teams (Damian *et al.*, 2007, p. 85).

It may be that there is an illusion of shared understanding – it may be thought that the presence of a project management methodology and its associated artefacts such as plans and procedure gives the impression of shared understanding. Walsham (1997) discusses shared interpretation and values in terms of organisational IS implementation;

> The social process centred on a particular IS issue is often mediated by formal procedures such as the use of strategy frameworks, evaluation methods, or design and development methodologies. An exercise using formal procedures may have overt or covert functions from the perspective of individual stakeholders, and in some cases may be viewed as a ritual, expressing for example symbolic belief in management competence. However, in all cases, the social context of the use of a formal procedure includes the informal assessments of individuals and stakeholder groups, reflecting their own set of perceptions and rationalities. The outcome of a formal exercise does not therefore necessarily represent a shared interpretative scheme amongst the various stakeholders, and may not embody shared interests and values. A lack of shared interpretation or set of values with

> respect to a particular computer based IS may create a major problem in terms of organisational implementation.
>
> (Walsham, 1997, p. 236)

The project management methodology may not in itself be enough to guarantee shared understanding, but the importance of doing so is evident, as illustrated by Joshi *et al.* In a paper looking at knowledge transfer within IS development teams, Joshi *et al.* (2007) point out that:

> In order to gain and sustain a competitive advantage in the global economy, today's organizations need to effectively mobilize their knowledge resources. Knowledge transfer (KT) activity is central to the organizations' knowledge mobilization efforts and knowledge transfer occurs when knowledge is diffused from one entity (e.g., an individual, group, or organization) to other entities. Knowledge may be purposefully transferred, or it may occur as an unintended outcome of other activities.
>
> (Joshi *et al.*, 2007, p. 322)

In an earlier section of this literature review, the ways that project management methodologies provide a range of techniques in order to '*decide precisely what to build*' and then carry out the project activities, such as system development work were considered. The system development work is carried out by people, who are often brought together (sometimes virtually) to work in a temporary environment. The setting may therefore be considered a sociotechnical environment where people interact by means of a technical language or technology of some kind. As Chakraborty *et al.* (2010) make clear:

'While it has remained a key topic of interest for IS researchers, a review of the existing literature suggests that there are very few studies examining how the social process associated with RE unfolds. Prior literature acknowledges that this process involves collaboration between RE participants (e.g., user-reps and systems analysts) where knowledge regarding the system requirements is shared, absorbed, and coconstructed, such that shared mental models of the requirements can form. However, collaboration and knowledge sharing within the RE process has been characterized as tenuous in the literature, given that the groups of RE participants bring very different kinds of knowledge into this activity, and trust among the two parties cannot be guaranteed at any point.

(Chakraborty *et al.,* 2010, pp. 212-249)

Therefor there is a human aspect to the activities relating to the creation of information systems that must not be overlooked. In a paper that looks to develop a process model of user analyst relationships to guide research into the social dynamics of system development, Newman and Robey (1992) say that:

The development of an information system is a social process involving users and systems analysts, carried out in an organizational setting

(Newman and Robey, 1992, p249)

and that:

Knowledge about the social process of ISD is likely to be a valuable complement to our current understanding of system development and its outcomes.

(Newman and Robey, 1992, p264)

If the social process of IS is important, perhaps project managers should make this a focal point for consideration during a project. Demarco and Lister (1999) look at productive projects and teams, and say that in fact, managers often concentrate on technological issues, rather than people issues. They go on to emphasise that the major problems associated with projects are:

> Not so much technological as sociological in nature.
>
> (Demarco and Lister, 1999, p.4)

Some work has been done in trying to develop an approach to developing shared understanding in teams operating in technological environments. Rooij *et al.* (Rooij *et al.*, 2007) reported on an explorative study aimed at barriers for developing shared understanding within virtual teams in high technology organizations. They discuss barriers for shared understanding in the context of teams and say that:

> Shared understanding in the context of a team relates to different aspects, sometimes referred to as 'mental models' of the team. A team mental model refers to an organized understanding or mental representation of knowledge that is shared by team members... the idea being that team effectiveness will improve when team members have an adequate shared understanding of a team's task, the structure of the team, available equipment and the situation in which the team operates.
>
> (Rooij *et al.*, 2007, p.65)

It appears that the team mental model (if aligned) will make it easier to develop technological outputs that are of a higher value. In this thesis it is assumed that one of the major aids to developing an effective system, is the definition of requirements to an acceptable level of quality. Perhaps a similar social team background may help to create understanding, and therefore better definition of requirements in IS team environments.

Sawyer *et al.* (2010) carried out a longitudinal study of information systems development (ISD) teams using data drawn from 60 ISD teams at 22 sites of 15 Fortune 500 organizations to explore variations in performance relative to these teams' social interactions. Sawyer *et al.* say that having team members with similar backgrounds appears to help in achieving this goal. It is interesting to note then, that oddly, Sawyer *et al.* suggest that:

> Higher levels of requirements completion performance are not reflected in post-implementation user assessments. That is, we cannot substantiate the commonly held 'truism' that requirements are an instrumental predictor of ISD success and that this is evidence of the complex nature of ISD performance.
>
> (Sawyer *et al.*, 2010, p.100)

The need to strive for good requirements must still be recognized but it may be important from Sawyer *et al.'s* comments to acknowledge that it may not be adequate on its own. The actors in an IS project (part of a social process) have to share knowledge effectively in order to create an environment for successful decision making. In an article that aims to draw attention to a set of pervasive knowledge management errors, Fahey (1998) states that:

> If knowledge exists ultimately within individuals, and it is individuals participating simultaneously in multiple group processes who make and execute key decisions, then a fundamental purpose of managing knowledge must be to build some degree of shared context. Shared context means a shared understanding of an organization's external and internal worlds and how these worlds are connected. Shared context is dynamic: knowledge as flow implies that any shared understanding is likely to change over time, and sometimes may do so suddenly. In the absence of shared context, individuals' differing perspectives, beliefs,

assumptions, and views of the future are most likely to collide and thus immobilize decision making.

(Fahey, 1998, p. 265).

There are a number of factors that complicate the interaction between individuals in relation to the transfer of knowledge in an IS setting. Norman (1993) emphasizes that intelligent human activity is not the individual mind in isolation but the interaction of the mind with tools and artefacts as well as groups of minds in interaction with each other. In an article that aims to demonstrate how language views can be adopted into an information systems context, Jackson (1992) points out that:

> System methodologies are not social theories. They are <u>not</u> accounts of what the real world is like, but are attempts to set out principles of method for systems researchers to follow when they seek to learn about and (especially) to intervene in the real world. Nevertheless, any principles or methods for intervening in the real world must contain certain assumptions about how we can and should learn about reality and about the nature of that reality. This is true whether these assumptions are stated explicitly or remain hidden.
>
> (Jackson, 1992, pp. 17-18).

But if the way that individuals interact and then form mental models and shared understanding is related primarily to the characteristics of the individual, how does that mechanism work? Wood and Bandura (1989) say that social cognitive theory explains psychological functioning in terms of triadic reciprocal causation, shown as Figure 4. In this model, behaviour (B), cognitive and other personal factors (P) and environmental events (E) operate as interacting determinants that influence each other bi-directionally.

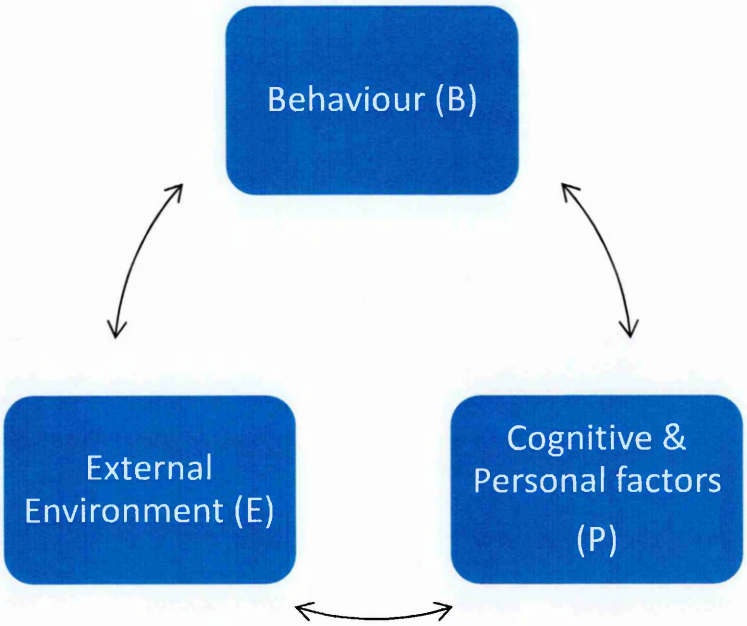


Figure 4: Triadic reciprocal causation, (Wood and Bandura, 1989, p.362)

Factors relating to common understanding of ideas, objects or concept may play a part in successful transfer of knowledge. Tan (1994) reports on the findings of a study of the communication behaviours of systems analysts when they work with clients to determine systems requirements. Tan says that:

> Mutual understanding emphasizes the need for shared meaning. Shared meaning occurs when some sort of exchange by which the meaning of one person is made to correspond to an already existing meaning of another person. This communicative process implies that communicators must have similar cognitive choices and that they know they share the same knowledge domain. Shared meaning is conceptualized in terms of how accurately a message enables a receiver to select the cognitive object chosen by the sender; that is, how accurately the listener decodes the message received. Thus, when communicators select similar cognitive objects, they share common codes or rules. When this occurs, there is less misinterpretation and misinformation.

> Consequently, there would be less cognitive dissonance between the communicators. Cognitive dissonance can make information processing stressful and problematic for decision makers when confronted with a multitude of alternatives.
>
> (Tan, 1994, p. 162).

Conceptualisation and then formation of understanding seems to be at least influenced by the cognitive profile of the individual and the context in which the information is communicated. The context of the IS activity may be an important factor, as Joshi *et al.* (2007) discuss in a paper about knowledge transfer within information systems development teams. They see transfer of knowledge as the transmission of a message from a source to the recipient in a given context. Transfer is seen to be effective when it is absorbed by the recipient, and absorption often influences the behaviour of the recipient in a certain way (p. 325). Joshi *et al.* (op cit) say that:

> The connectionistic perspective on the other hand does not view knowledge as having universal characteristics. Knowledge is seen to be contextual, and local differences between the rules and stocks of knowledge exist. Unlike the cognitivistic perspective, the connectionistic theorists who believe that knowledge transfer between knowledge sources and recipients is inherently difficult especially due to the contextualized nature of knowledge, and due to different factors such as the need for shared understanding, and the nature of connections through social interactions, ties, or networks, (the connectionistic perspective views knowledge as context-bound, and holds that the specification of the appearance (or nature) of knowledge is critical).
>
> (Joshi *et al.*, 2007, p. 324)

Joshi *et al.* also say that:

> Knowledge is viewed as history-dependent. Further, knowledge is believed to develop in an autonomous manner, and is not characterized as abstract and so it is therefore not seen as shareable. Researchers adhering to this perspective refer to knowledge conversion and not knowledge transfer. They further argue that since knowledge cannot be ever shared, it is always created.
>
> (Joshi *et al.*, 2007, p. 324)

The cognitive style (or cognitive filter) is another factor that may influence IS project outcomes. In an article that looks toward a 'unified model of information systems development success', Siau *et al.* (2010) examine cognitive styles and define them as:

> Characteristic modes of functioning that people show throughout their perceptive and intellectual activities in a highly consistent and pervasive way... cognitive style perceptions are suggested as possible explanations for the communication barrier that is often found between users and system specialists.
>
> (Siau *et al.*, 2010, p. 82)

Cognitive style may partly explain why shared understanding is difficult to measure. Siau *et al.* explain that:

> Cognitive styles have been derived from Jung's (1923) theory of psychological types. Jung contended that people have distinctive differences in the way they gather and process data. Some people take in data by sensing, stressing facts and details (what is in actuality), and others by intuition, stressing possibilities, (what might be) as well as environmental and contextual factors.
>
> (Siau *et al.*, 2010, p. 82)

If shared understanding cannot be easily measured, perhaps an organisational approach could be taken to assembling project teams so that the chances of putting teams together that are more likely to achieve shared understanding are maximised. Siau *et al.* (op cit) suggest that a balance of personality types (based on Jung's types) should be sought as individuals are predisposed to one of the four preference alternatives in their behaviour;

> 1 How a person is energised – designated by extroverts versus introverts
>
> 2 What information a person perceives – designated by sensing versus intuition
>
> 3 How a person decides – thinking versus feeling
>
> 4 The lifestyle a person adopts – judging versus perceiving
>
> (Siau *et al.* 2010 p. 82)

Smart *et al.* (2009.) attempts to improve our understanding of shared understanding by exploring the nature of understanding, situation awareness and mental models (p. 1). They explain that:

> Three sorts of reasons as to why something is difficult to understand. Something may be difficult to understand because 1) it is structurally complex, 2) because it is incoherent and ambiguous (i.e. it fails to cohere with the elements of a larger nexus of contextual elements), or 3) because it is vague and indistinct. In general, things that are difficult to understand all seem to involve a knowledge or awareness of the relationships between various things. Thus, in the case of things that are structurally complex we need to know or be aware of the relationships between constituent parts of the object of understanding; in the case of things that are incoherent or ambiguous we need to know or be aware of the relationships between the object of understanding and the wider relationships it has to external or surrounding objects; and in the case of things that are vague we need to know

> or be aware of the relationships (properties) that dictate the conditions of category membership.
>
> (Smart, 2005, p. 5).

It is obvious that more research is required in this domain and it may emerge that true shared understanding is beyond our reach; In an attempt to shed light on the subject of shared understanding, Smart *et al.* (op cit), in discussing shared understanding in the context of military coalition activity says that shared understanding will not be identical:

> The shared understanding that individuals possess (as determined by their predictive and explanatory capabilities) will not be identical in most cases. In addition, the shared understanding between individuals will rarely, if ever, be complete; individuals will often possess limited forms of shared understanding that are specific to some particular situation or task context.
>
> (Smart, 2005, p. 5).

Are there any documented cases where shared understanding is believed to have existed? There could be cases where there is a proven shared understanding that exists in a project where each individual possesses a single consistent view that is compatible at all levels with those held by team members, but this has not been easy to find in any literature reviewed. Gallivan and Keil (2003) note that:

> There is still much that we do not know about how and why user participation sometimes delivers positive benefits, but not always. Most research models that investigate user participation implicitly assume that when users participate in system development, communication between users and software developers that is necessary for clear requirements definition will occur. Moreover, these models

> often assume that user–developer communication will ensure that the resulting system will be designed to meet users' needs and will be accepted by them.
>
> (Gallivan and Keil, 2003, p. 38)

The search for shared understanding (or at least the best possible degree of shared understanding) is challenging but the authors cited above say that where it exists in a project it should provide a better platform for the delivery of a successful project. In a paper that examines shared understanding in software engineering, Glinz and Fricker (2013) say that:

> Shared understanding among a group of people has two facets: explicit shared understanding (ESU) is about interpreting explicit specifications, such as requirements, design documents, and manuals, in the same way by all group members. Implicit shared understanding (ISU) denotes the common understanding of non-specified knowledge, assumptions, opinions, and values. The shared context provided by implicit shared understanding reduces the need for explicit communication and, at the same time, lowers the risk of misunderstandings.
>
> (Glinz and Fricker, 2013, p. 1)

They also say:

> It is important to note that shared understanding can be *true* or *false*. False shared understanding means that a group of people believes to have shared understanding about some issue while in fact there are misunderstandings that may or may not have been noticed. In any software development or evolution endeavour there is a *context boundary* that separates information which is relevant for the system to be built from information which is irrelevant. Note that building

> and assessing shared understanding about irrelevant information constitutes a waste of effort. Also, there is typically information which is relevant, but has not yet been noticed by anybody of the persons involved. We call this *dark information.*
>
> (Glinz and Fricker, 2013, p. 4)

In a similar vein to Glinz and Fricker's comments, Mckay and Marshall (2005 p.15) also warn that where shared understanding is understood to exist there is a risk that it is a 'false consensus'. Although Mckay and Marshall cite just one project, it may be the case that far from being an isolated case, a false sense of security regarding the level of understanding in a project may be more common than we currently expect. It may be the case that on occasions, project staff behave or communicate as if there is a true understanding but there may be an underlying, unknown misunderstanding that has not been addressed. Charaf *et al.* (2013) describes a noteworthy study where stakeholders in two distinct domains were observed during their development of an internet based application. From their observations, they developed a number of communication categories to describe the type of actions that lead to triggering, changing or adding to a shared stakeholder (project) language. Charaf *et al.* describe the four main categories as Definition, Request, Reassurance and Adjustment (p. 122). In addition, they identified Continuation (an acceptance or rejection of prior language alignment) and most interestingly, a category called Alignment Not Required. Charaf *et al.* describe this category as one where the 'stakeholder assumes whether or not semantic alignment is necessary' (p. 123) . This situation is important to recognise as if the assumption that no semantic alignment is required is false, then two differing understandings will exist. Charaf *et al.* shows that where alignment is sought, action will continue via one of the four main categories. It also shows that where an individual assumes that no alignment is required (even where they do not actually have shared understanding) action will also continue.

If shared understanding is a fundamental condition for the delivery of a project, the question is how can we achieve it? Arias *et al.* (2000) discusses shared understanding and the problems of creating shared understanding amongst various stakeholders, they note that:

> Complex design problems require more knowledge than any single person possesses because the knowledge relevant to a problem is usually distributed among stakeholders. Bringing different and often controversial points of view together to create a shared understanding among these stakeholders can lead to new insights, new ideas, and new artefacts.
>
> (Arias *et al.*, 2000, p. 84)

And, raising the issue of teams and their need to cooperate:

> Because complex problems require more knowledge than any single person possesses, it is necessary for all involved stakeholders to participate, communicate, and collaborate with each other. For example, domain experts understand the domain concepts and practice whereas system designers know the technology. Communication breakdowns are often experienced because stakeholders belonging to different cultures use different norms, symbols, and representations.
>
> (Arias *et al.*,2000, p. 86)

Arias *et al.* (2000) suggest that future agendas need to include the development of innovative information technologies to support collaborative design and learning in domains characterized by complex problems—in particular, they should include a basis for understanding how and why to:

- support distributed cognition in order to transcend the individual human mind
- exploit the symmetry of ignorance by constructing shared understanding
- utilize externalizations to extend our cognitive abilities
- contextualize information to avoid information overload and to increase opportunities for learning on demand
- introduce and support the notion of informed participation because access, although necessary, is not sufficient
- move beyond closed systems to support open, evolving contexts of complex design problems
- understanding motivation and rewards necessary to engage people in a design culture

(Arias *et al.*, 2000, pp. 92-93)

Arias *et al.*'s comments on the way that an individual's perspectives, beliefs, assumptions, and views influence their interaction relate to cognitive abilities and that will affect the way that an individual interacts or interprets messages from others inside the project environment. It is obvious that shared understanding is held to be a critical pre-requisite for the successful delivery of projects where software is a significant element of the undertaking.

A point of note is that little research was identified in the review that had examined how communication or shared understanding was achieved (or not) whilst the project was underway. This is important because as (Kransdorff, 1996, p. 11) Kransdorff points out, even end-of-project reviews are susceptible to the 'characteristic partial and selective memory recall by managers who, after the event, are rarely neutral or objective'. Related to this is the topic of 'hindsight bias'. Erdfelder *et al.* (2007) also tell us that the event outcome itself can influence recollection:

> Outcome knowledge can affect hindsight judgments in two different ways. First, learning about the outcome of an event can impair recollection of one's own earlier predictions concerning this event. Second, outcome knowledge can affect the reconstruction of past predictions given that they cannot be recollected.
>
> (Erdfelder *et al.*, 2007, p. 114)

It was noted that in reviewing the literature cited in this thesis, the default position appeared to be that the research was based on a post-project review.

2.4 Critical success factors

An early reference to critical success factors (CSFs) is made by Rockart (1979) in a paper that focuses on the use of information to assist in the efficient management of the 'few key areas' of a business where 'things must go right' for the business to flourish. Rockart makes reference back to the work of D. Ronald Daniel at McKinsey & Company in 1961 and describes CSFs as a tool to help executives define their significant information needs.

Rockart and Bullen (1981) develop the concept further in a paper that describes the importance of CSFs where the key to success for most managers is to focus their limited resource (their time) on those things which really make a difference between success and failure. They point out that:

> It is important for a manager to determine his goals --which are the targets he will shoot for. That is common managerial lore. It is equally important, however, to determine, in a conscious explicit manner, what the basic structural variables are which will most affect his success or failure in the pursuit of these goals. These are the critical success factors.
>
> (Rockart and Bullen, 1981, p. 13)

Describing the practical, intended use of CSFs, they go on to add that:

> CSFs are related to the specifics of a particular manager's situation. This means they must be tailored to the industry, the company, and the individual being interviewed. CSFs will certainly differ from manager to manager according to the individual's place in the organization's hierarchy. In addition, they often will change as the industry's environment changes, as the company's position within an industry changes, or as particular problems or opportunities arise for a particular manager. In this light, it is important to understand what CSFs are not. They are

> not a standard set of measures, sometimes called key indicators, which can be applied to all divisions of a company. They are not limited to factors which can be reported on by solely historical, aggregated, accounting information. On the contrary, the critical success factor method looks at the world from a manager's current operating viewpoint. CSFs are the particular areas of major importance to a particular manager, in a particular division, at a particular point in time.
>
> (Rockart and Bullen, 1981, pp. 13-14)

They then identify the four different hierarchical levels of critical success factors that must be considered:

- industry CSFs
- corporate CSFs
- sub-organization CSFs
- individual CSFs

(Rockart and Bullen, 1981, p. 19)

Importantly, Rockart and Bullen describe two further key benefits of the CSF process:

> The CSF procedure provides top management with a vehicle for thinking about their information needs. The CSF method, used as an aid for information systems planning, focuses on the definition of those information databases which are necessary to support the information needs of all (or at least a significant number) of top managers.
>
> (Rockart and Bullen, 1981, p. 43)

Rockart and Bullen are indicating that the CSFs have to be considered, presumably with the intention of leading to a better, customised approach to planning for that specific piece

of work. Boynlon and Smud (1984) echo Rockart's description of CSFs, saying that 'Critical success factors are those few things that must go well to ensure success for a manager or an organization, and, therefore, they represent those managerial or enterprise areas, that must be given special and continual attention to bring about high performance. CSFs include issues vital to an organization's current operating activities and to its future success' (p. 17). Boynlon and Smud acknowledge the work done by Daniel and Rockart in their assessment of CSFs and although they say that it is difficult to develop CSFs:

> A skilled analyst will find it easier to use than other analysis techniques and can be applied across a wide range of settings.
>
> (Boynlon and Smud, 1984, p. 19)

and:

> CSFs can induce a structured design process for eliciting MIS plans and requirements, and that CSFs are more useful in planning than in requirements analysis.
>
> (Boynlon and Smud, 1984, p. 19)

It would appear from Boynlon and Zmud's comments echo Rockart and Bullen's, in that they highlight the way that CSFs are to be used in planning. It is apparent that CSFs are by this date firmly in the domain of analysis, design and planning.

A more recent empirical study appeared to broadly echo the findings, identifying the top project success factors as: clear goals, support from senior management, and adequate resources (White and Fortune 2002). However, further work by Fortune and White (2006) indicates that some caution may be appropriate when reviewing 63 publications setting out critical success factors, only limited agreement among authors was found between the lists of factors.

Many lists of CSFs can be found in the literature, one of the most widely known is by the authors mentioned at the end of the last sub-section: Pinto and Slevin (1988). They carried out a study to test the importance of factors that had been believed to be critical to project success. Questionnaires were mailed to project managers and members of the Project Management Institute with 400 responses obtained. The critical success factors identified by the study were:

1. Clarity of project mission (initial clarity of goals and general directions).
2. Top management support (willingness of top management to provide the necessary resources and authority/power for project success).
3. Detailed project schedule and plans (a detailed specification of the individual action steps for project implementation).
4. Client consultation (communication, consultation and active listening to all impacted parties).
5. Personnel (recruitment, selection and training of the necessary personnel for the project team).
6. Technical expertise (availability of the required technology and expertise to accomplish the specific technical action steps).
7. Client acceptance (the act of 'selling' the final project to its ultimate intended users).
8. Monitoring and feedback (timely provision of comprehensive control information at each phase in the implementation process).
9. Communication (the provision of an appropriate network and necessary data to all key actors in the project implementation).
10. Troubleshooting (ability to handle unexpected crises and deviations from plan).

By 1989 Pinto and Covin (1989) had undertaken a further survey to investigate the critical factors in project implementation in two different projects; one was a construction project and the other was R&D. This study is interesting as they had selected the two projects because they appeared to be at opposite ends of a spectrum of characteristics. They say that their main findings suggest that while some critical success factors appear to be common to both projects there also exist significant differences and furthermore that these factors tend to vary with stages in the life cycle. These findings are noteworthy , as they seem to describe some surprise on the part of the researchers that there are some CSFs that are common even though they are in differing industries. This is despite the fact that Rockart (op cit) had indicated there are some CSFs that are common to differing industries but the creation of other, useful CSFs will be determined by analysis of the particular situation that prevails at that time.

Belassi and Tukel (1996) drew a number of CSF listings together to allow comparisons to be made between then. Their table is reproduced here as Table 2.5.

Martin (1976)	**Define goals, select project organisational philosophy, general management support, organise and delegate authority, select project team, allocate sufficient resources, provide for control and information mechanisms, require planning and review.**
Locke (1984)	Make project commitments known, project authority from the top, appoint competent project manager, set up communications and procedures, set up control mechanisms, progress meetings
Cleland and King (1983)	Project summary, operational concept, top management support, financial support, logistic requirements, facility support, market intelligence (who is the client), project schedule, executive development and training, manpower and organisation, acquisition Information and communication channels, project review
Sayles and Chandler (1971)	Project manager's competence, scheduling, control systems and responsibilities, monitoring and feedback, continuing involvement in the project
Baker, Murphy and Fisher (1983)	Clear goals, goal commitment of project team, on-site project manager, adequate funding to completion, adequate project team capability, accurate initial cost estimates, minimum start-up difficulties, planning and control techniques, task (vs. Social orientation, absence of bureaucracy
Pinto and	Top management support, client consultation, personnel recruitment,

Slevin (1989)	technical tasks, client acceptance, monitoring and feedback, communication, trouble-shooting, characteristics of the project team leader, power and politics, environment events, urgency
Morris and Hough (1987)	Project objectives, technical uncertainty, innovations, politics, community involvement, schedule duration urgency, financial contract, legal problems, implement problems

Table 2.5 Combined Critical Success Factor list (Source: Belassi and Tukel, 1996, p. 144)

Belassi and Tukel synthesised the lists to create a framework that groups the factors into four areas: factors related to the project; factors related to the project manager and the team members; factors related to the organization; and factors related to the external environment. The framework is shown in Figure 5:

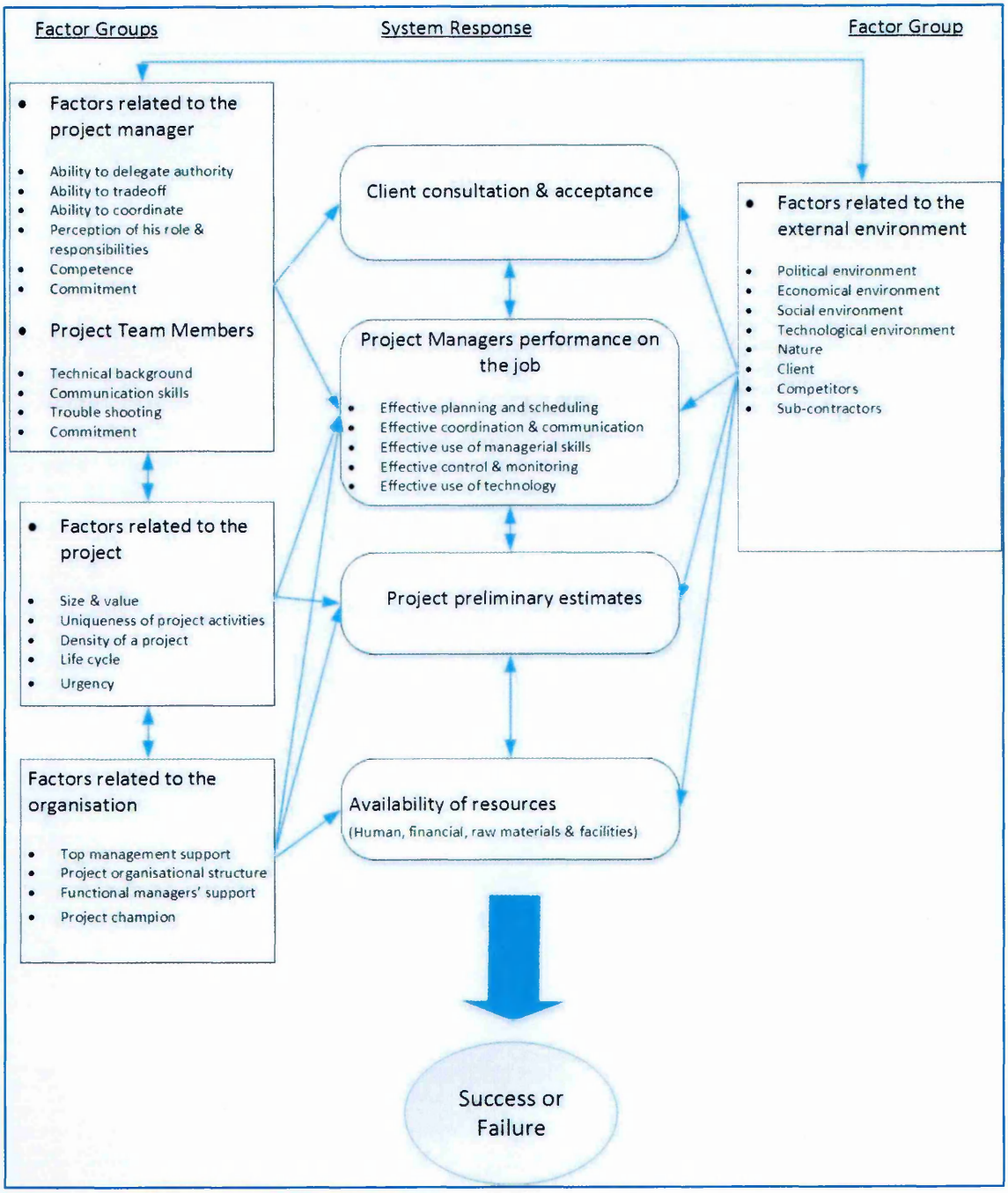


Figure 5: Project success factors framework, (Belassi and Tukel, 1996, p.144)

As Belassi and Tukel note:

> Most, if not all, of these lists include factors related to the project manager and to the organization the project belongs to, and seem to ignore project characteristics, characteristics of team members and factors external to the project.
>
> (Belassi and Tukel, 1996, p. 142)

They then go on to examine these factors further. For example, they point to the need for the project manager to communicate with the client:

> A project manager's marketing skills influence the client's attitude towards the project outcome. Similarly, well established communication channels between the project manager, the organisation and the client are necessary for the acceptance of the project outcome by the client.
>
> (Belassi and Tukel, 1996, p. 145)

And for a project manager to facilitate communication in the other direction:

> [Top management] support is usually strongest if there is a project champion and this champion is from the top management. He helps project managers understand and achieve the project objectives which are specified by the client
>
> (Belassi and Tukel, 1996, p. 145)

Communication is highlighted in these comments, but it is noticeable that within Figure 5 it is difficult to see any specific factors that relate to a need to ensure that all project team members (or other stakeholders) obtain a clear understanding of what the project is going to achieve. It is not made explicit exactly what the project manager should do with each of the suggested factors – for example a 'detailed plan' might mean different things to different project managers, as might what constitutes 'client consultation' and so on.

Fortune and Peters (2005) emphasize the importance of the interrelationships between CSF factors in different groups, and how they are as important as the individual factors themselves. They go on to explain that the concept of a CSF is useful in that it attempts to understand failure by the use of these factors as a set or criteria for assessing project

performance; but importantly also, that one of the difficulties with this is knowing what would have constituted the 'optimal state' for any particular project and that further, there is difficulty is in deciding which set of factors to use, as when the factors are examined at anything but a superficial level there is only limited agreement among authors on the contents of the sets. They note that the factors cited most frequently are the importance of a project receiving support from senior management, having clear and realistic objectives and producing an efficient plan.

Fortune and White (2006) conducted a major review of the sets of CSFs that are available. They examined 63 publications that focus on CSFs and drew up a table (reproduced here as Table 2.6) to show, in decreasing order, the frequency of mention of each factor. As Table 2.6 shows, Fortune and White found only limited agreement among authors on the factors that influence project success. Indeed, looking at the three most cited factors (the importance of a project receiving support from senior management, having clear and realistic objectives and producing an efficient plan), only 17% of the sets included all three anywhere within them.

Critical Factor	**Count of Citations**
Support from senior management	39
Clear realistic objectives	31
Strong/detailed plan kept up to date	29
Good communication/feedback	27
User/client involvement	24
Skilled/suitably qualified/sufficient staff/team	20
Effective change management	19
Competent project manager	19
Strong business case/sound basis for project	16
Sufficient/well allocated resources	16
Good leadership	15
Proven/familiar technology	14
Realistic schedule	14
Risks addressed/assessed/managed	13
Project sponsor/champion	12

Effective monitoring/control	12
Adequate budget	11
Organisational adaptation/culture/structure	10
Good performance by suppliers/contractors/consultants	10
Planned close down/review/acceptance of possible failure	9
Training provision	7
Political stability	6
Correct choice/past experience of project management methodology/tools	6
Environmental influences	6
Past experience (learning from)	5
Project size (large)/level of complexity (high)/number of people involved (too many)/duration (over 3 years)	4
Different viewpoints (appreciating)	3

Table 2.6 Framing of project critical success factors by a systems model (Source: Fortune and White, 2006, pp. 53-65)

Ika (2009) examines project success as a topic in two project management journals, the *Project Management Journal* and the *International Journal of Project Management*, between the period 1986 and 2004. He shows how (see table 2.7) how the research focus has changed over time in relation to the topics of success criteria, success factors and emphasis.

Research Focus	1960s–1980s	1980s–2000s	21st Century
Success criteria	'Iron triangle' (time, cost, quality)	Iron triangle Client satisfaction Benefits to organization (org) End-user's satisfaction Benefits to stakeholders Benefits to project personnel	Iron triangle Strategic objective of client organizations and business success End-user's satisfaction Benefits to stakeholders Benefits to project personnel and symbolic and rhetoric evaluations of success and failure
Success factors	Anecdotic lists	CSF lists and frameworks	More inclusive CSF frameworks and symbolic and rhetoric success factors
Emphasis	Project management success	Project/product success	Project/product, portfolio, and program success and narratives of success and failure

Table 2.7 Measuring success across time (Source: Ika, 2009, p. 11)

As Table 2.7 shows, the focus related to success criteria has expanded beyond time, cost and quality as a limited set of success criteria by the addition of further criteria such as strategic objective of client organisations, end user satisfaction and benefits to stakeholders. Similarly, success factors have developed from anecdotic lists in the period 1960s to 1980s to 'more inclusive CSF frameworks and symbolic and rhetoric success factors' in the 21st century.

Clearly, a wide range of CSFs are reported in the existing literature. It is also evident that many believe there are a number of factors that can be usefully considered and acted upon at appropriate times during a project. It would be prudent, however to take on board Fortune and White's (op cit) argument that the use of CSFs is not as straightforward as it may seem. The first point they make is that the inter-relationships between factors are at least as important as the individual factors themselves but the CSF approach does not provide a mechanism for taking account of these interrelationships. The second is that the factor approach tends to view implementation as a static process instead of a dynamic phenomenon, and ignores the potential for a factor to have varying levels of importance at different stages of the implementation process. This raises an important question. If it is valid to assume CSFs have informed the project management community in the development of management techniques and that the analysis of CSFs at the start of, and during a project is a potent tool that can assist in increasing the probability of project success and that appropriate use will help to deliver success, why is it then, that so many systems projects still fail? The next subsection of this chapter will look at this question of why systems projects fail.

2.5 Why do systems projects fail?

In asking the question 'Why do systems projects fail?', it is reasonable to ask what we mean by success or failure. A considerable amount of literature has been published on the topic of project management success. The literature typically divides project success into two components (Morris and Hough, 1987, Turner, 1999, Wateridge, 1998) whereby project success factors are comparable to independent variables that contribute to the likelihood of success and project success criteria are measures used to determine if a project was actually a success or a failure. It is difficult though to even come to an agreement on how to determine if a project is a success or not. According to Shenhar *et al.* (2001, p. 716) there is a 'changing nature of success measurement with its short- and long-term implications', suggesting that definition of success is a rather nebulous object that may not be achievable. In their report of a study that aimed to develop a conceptual framework for the assessment of project success and to identify the major dimensions with which to measure success in various projects, and suggest that measuring success will mean different things to different people. They conclude that:

> Defining and assessing project success is therefore a strategic management concept, which should help align project efforts with the short- and long-term goals of the organization... different dimensions mean different things to different stakeholders at different times and for different projects.
>
> (Shenhar *et al.*, 2001, p. 699)

De Wit (1988) asks if project success can really be measured at all, and particularly with a minimal set of measures such as progress, cost and quality. He suggests:

> The measurement of progress, cost and quality is no doubt an essential part of project control but this activity should certainly not be confused with measuring success and that when attempting to measure success one must make a

> distinction between project success and the success of the project management effort, as the two although related, may be very different.
>
> (de Wit, 1988, p. 164).

Wateridge (1998) also argues that it is not possible to specify and make use of a standard, pre-defined set of measures, and that they must be defined for each unique project:

> The success criteria proposed have been limited by the fact that not all the views of project stakeholders have been considered. However, the criteria will vary from project to project depending on a number of issues (for example, urgency, cost, functionality, quality, profit). The project team need to agree the criteria before embarking on the project otherwise different members will find themselves travelling in different directions and one or more of the team members will perceive the project to be a failure.
>
> (Wateridge, 1998, p. 59)

More recently, Muller and Jugdev (2012) write about the topic of project success. They confirm that the project success is still an important topic and point out that:

> The subject of project success is at the heart of project management. Many factors impact the degree of project success. Project success is therefore among the top priorities of project managers and project stakeholders. It is not surprising then that the topic has interested academics and practitioners for decades and continues to be of relevance today.
>
> (Muller and Jugdev, 2012, p. 758)

Whilst acknowledging that answering the question 'Why do systems projects fail?' is difficult, the fact remains that information systems (where software is an important part of the system) are built to serve purposeful action. In undertaking the task of developing large and complex versions of such systems, a number of difficulties usually have to overcome in order to deliver an effective (successful) solution that meets the needs of the clients and other stakeholders. Might it be that IT projects have a particular complexity that is not present in other projects? Is there something special about IT projects that makes it highly likely that it will fail? In a report that looked at the challenges of complex IT projects, The Royal Academy of Engineering (2004) drew attention to the 'monumental UK IT spend in 2003/2004 of £22 Billion' (p. 4) and the fact that significant numbers of complex software and IT projects still failed to deliver key benefits on time and to target cost and specification. They discuss the difficulties associated with change where software development is present and say that:

> ... there is a perception that IT projects have lower success rates than those in more established branches of engineering. Irrespective of the accuracy of this presumption, it is worthwhile exploring the distinctive qualities of IT projects in comparison to other engineering projects, since proper comprehension of the nature of software is prerequisite for the successful application of engineering principles to this discipline.
>
> Royal Academy of Engineering, 2004, p. 13

The report identifies the characteristics of projects that have an element of software development. These characteristics are reproduced here as Table 2.8.

Characteristic	Description
A lack of constraints	IT projects are not subject to the laws of physics and the associated constraints in the same way as, for example, civil engineering projects. This can produce a perception that anything and everything is possible with IT but of course, this is not the case – software is governed by real constraints, but these tend to be multidimensional and abstract in nature, and therefore difficult to understand and communicate.
Visualisation	Software is effectively invisible. This visualisation problem is a source of many potential IT project failures. Senior managers commissioning IT systems may ask for functions that are over-ambitious, or even impossible to deliver, without having any sense of the level of complexity entailed in meeting their request. It is also extremely challenging to represent the key facets of software in a way which is accessible to all stakeholders, making the specification process potentially fraught. In the case of a building, it is fairly easy to generate a physical representation that can be debated by the stakeholders and used as a blueprint. Many graphical representations are used for software specification, e.g. the Unified Modelling Language (UML), but these are subject to ambiguities and only deal with limited aspects of the system. A further difficulty associated with the 'invisibility' of software occurs during monitoring of the project. The lack of a readily tangible product means that it is very easy for the project to proceed for a considerable time before problems become apparent, and without it being possible to verify that the passing of time and expenditure of money correlate with progression of the project in the desired direction
Flexibility	A related problem for IT projects, also stemming from the intangible nature of software, is abuse of the perceived flexibility of software. The inability to visualise the boundaries of what is possible or practical in IT encourages people to change their mind more frequently than they might do for engineering projects where constraints are obvious. Excessive requests for new features or alteration of functions etc. during the course of the project introduce unnecessary and undesirable complexity. This contributes to time and budget over-run, thereby increasing the chance of project failure.
Complexity	Complexity can be a significant obstacle to successful design and delivery of IT projects. Although major projects in other engineering disciplines obviously also have to contend with complexity, it seems that in software engineering, complexity is both harder to detect and less well understood. In IT, complexity is multi-dimensional, encompassing scale, diversity, heterogeneity etc. A proportion of the complexity is warranted, i.e. necessary for the delivery of the

	requirements, whilst the remainder can be considered unwarranted and can interfere with the efficiency and reliability of the system.
Uncertainty	Many complex IT systems seek to undertake or augment tasks previously carried out by people. There can be great difficulty in elucidating clear requirements for such systems. By comparison the task of actually implementing the specified system can be comparatively straightforward. There is a clear analogy here with the construction industry where there is more uncertainty in the specification of, say, a hospital than there is technical risk in building it. Nevertheless, uncertainty can also cause problems in implementation of the specified system and it is possible to exceed even today's colossal computing capability. The evidence collected suggested that this is most likely to occur in meeting non-functional requirements such as security, scalability or speed of response. Limitations on the actual function undertaken by the IT system relate mainly to attempts to match human capabilities in fields like pattern recognition or natural language understanding.
Supporting change	The majority of IT projects are undertaken to deliver some kind of business or process change. In some cases, IT systems will be introduced to enable a major business transformation, in other cases they will be automating an existing process. Even when the aim is defined as automation, the people involved will need to alter their practices, so business change in some form will ultimately result. As a consequence, IT practitioners need – but unfortunately do not always have – an understanding of the business and the processes concerned if the IT system is to achieve the intended outcome.

Table 2.8 The challenges of complex IT projects (Source: Royal Academy of Engineering, 2004, pp. 13-17)

The report also lists the common causes of project failure:

1. Lack of clear link between the project and the organisation's key strategic priorities, including agreed measures of success
2. Lack of clear senior management and Ministerial ownership and leadership.
3. Lack of effective engagement with stakeholders.
4. Lack of skills and proven approach to project management and risk management.
5. Lack of understanding of and contact with the supply industry at senior levels in the organisation.

6. Evaluation of proposals driven by initial price rather than long term value for money (especially securing delivery of business benefits).
7. Too little attention to breaking development and implementation into manageable steps.
8. Inadequate resources and skills to deliver the total portfolio.

(Royal Academy of Engineering, 2004, p. 10)

Table 2.8 includes reference to uncertainty and supporting change. Both of these are areas that link to the definition of what has to be achieved in the project. It is somewhat interesting that uncertainty is listed in Table 2.8, but the common causes of failure described by the Royal Academy do not include any specific reference to uncertainty playing a part in project failure.

White and Fortune (White and Fortune, 2009, p.43) note that a wide variety of methods and techniques are available to help programme and project managers to plan, design and manage programmes and projects, but those undertakings continue to be prone to disruption, delay, escalating costs and failure to deliver outcomes that possess fitness for purpose. As Table 2.9 shows, they identify a number of failings associated with projects grouped by project area.

Project Area	Failing
Environment	Failure to: manage uncertainty in environment; learn from past experience; take account of the effect of inflation; recognise political influences; view the project from multiple perspectives
Context	Failure to: consider complexity; consider context in which project is placed; be fully aware of situation; assess influence of values, beliefs and culture
Objectives	Failure to: identify requirements; formulate clear measures of performance; consider views of end-users; produce realistic schedule; produce business plan
Control	Failure to: control project; manage team; identify groupthink; gain full commitment of those involved; provide adequate training; abandon project (if necessary) for fear of admitting defeat; measure/monitor progress; establish tracking systems; appreciate that seeking consensus is impossible; manage/overcome resistance to change; put human issues before technical issues; adapt new systems to old ways of working; implement business plan; acknowledge that projects do not follow linear route to completion
Communications	Failure to: provide effective channels of communication; develop communication plan; communicate benefits of project to staff; halt misleading information
Resources	Failure to: supply satisfactory resources; provide adequate / sophisticated technology; ensure reliability of technology; understand underlying technology; provide adequate budget; employ properly qualified staff

Table 2.9 Failings associated with projects (Source: White and Fortune, 2009, p.43)

These failings are noteworthy because they do not focus purely on the mechanics or basic properties of a project management method. They widen the context in which the project is considered and say that values, culture and belief should be considered during the project. Differences in these areas that are not recognised and managed appropriately could lead to failure.

In his study, Charette (2005, op cit) suggests:

> Software project failures have a lot in common with airplane crashes. Just as pilots never intend to crash, software developers don't aim to fail. When a

> commercial plane crashes, investigators look at many factors, such as the weather, maintenance records, the pilot's disposition and training, and cultural factors within the airline. Similarly, we need to look at the business environment, technical management, project management, and organizational culture to get to the roots of software failures.
>
> (Charette, 2005, p. 46)

He also identifies the following as the most frequent reasons for project failure:

> • Unrealistic or unarticulated project goals
> • Inaccurate estimates of needed resources
> • Badly defined system requirements
> • Poor reporting of the project's status
> • Unmanaged risks
> • Poor communication among customers, developers, and users
> • Use of immature technology
> • Inability to handle the project's complexity
> • Sloppy development practices
> • Poor project management
> • Stakeholder politics
> • Commercial pressures
>
> (Charrette, 2005, p. 45)

Note that the top four reasons have an element of communication and understanding that would be essential for them to be mitigated. He also goes on to mention complicated interaction in the project, which would presumably require shared understanding in order to provide a sound platform for the project:

> IT projects rarely fail for just one or two reasons... Most failures, in fact, can be traced to a combination of technical, project management, and business decisions. Each dimension interacts with the others in complicated ways that exacerbate project risks and problems and increase the likelihood of failure.
>
> (Charrette, 2005, p. 46)

Some of the reasons for failure identified by Charette are similar in nature to those included by the Royal Academy of Engineering in their report , (Royal Academy of Engineering , 2004, op cit). The two lists cannot easily be mapped onto each other but nevertheless an attempt to do so is shown in Table 2.10. As the reasons are couched in differing phraseology and terms it can expected that there is no absolute equivalent between each description. In comparing the two lists however, it is possible to see reasons from each list that suggest some strong commonality, others less so and some that do not match at all.

Charette. R, (2005)	Royal Academy of Engineering, (2004)	Comments
Poor communication among customers, developers, and users **Stakeholder politics (possibly, arguably)**	Lack of effective engagement with stakeholders.	Assuming that Charette is describing poor communication among customers, developers and users as something that can be addressed in an effective engagement with stakeholders then this could be considered a strong match. Stakeholder politics might also be argued to be a similar, but possibly less strong match.
Unrealistic or unarticulated project goals	Lack of clear link between the project and the organisation's key strategic priorities, including agreed measures of success.	On the basis that both sets appear to describe the importance of recognising project goals this appears to be a strong match.
Poor project management **Unmanaged risks** **Poor reporting of the project's status**	Lack of skills and proven approach to project management and risk management.	Poor project management, unmanaged risks and poor reporting of the project's status appear to be very similar to lack of skills and proven approach to project management and risk management therefore seem to illustrate a good match.
Sloppy development practices	Too little attention to breaking development and implementation into manageable steps.	Although 'sloppy development practices' could cover a very wide gamut, 'too little attention to breaking development and implementation into manageable steps' might very well be included. This would indicate that there is a moderate match between these reasons.
Inaccurate estimates of needed resources **Inability to handle the project's**	Inadequate resources and skills to deliver the total portfolio	'Inaccurate estimates of needed resources' and 'Inability to handle the project's complexity' appear to strongly match 'Inadequate resources and skills to deliver the total portfolio'.

complexity		
Commercial pressures	Evaluation of proposals driven by initial price rather than long term value for money (especially securing delivery of business benefits).	'Commercial pressures' is admittedly a fairly generic descriptor but it is thought that it matches up strongly to 'Evaluation of proposals driven by initial price rather than long term value for money (especially securing delivery of business benefits)'.
	Lack of understanding of and contact with the supply industry at senior levels in the organisation.	This Royal Academy of Engineering reason for failure does not readily match up to any of Charette's reasons.
	Lack of clear senior management and Ministerial ownership and leadership.	This Royal Academy of Engineering reason for failure also does not readily match up to any of Charette's reasons.
Use of immature technology		This reason from Charette does not easily match easily to any of the reasons provided by the Royal Academy of Engineering
Badly defined system requirement		Although some might argue that there is some match with 'Lack of effective engagement with stakeholders' it is not a strong enough correlation as it is written to warrant any description more than a poor link. It really hinges on the definition of the word 'effective'; if the Royal Academy of Engineering description intends to infer that effective engagement is a 'catch-all' that includes requirements definition then there may well be a strong link, but if their description really concentrates on the concept of user engagement in isolation away from a requirements definition process, then the link cannot be made. The assumption made here is that the lack of engagement described by the Royal Academy of Engineering does not describe requirements definition.

Table 2.10 Mapping of reasons for failure (Source: Charette., 2005, pp. 42-49 and Royal Academy of Engineering, 2004, pp. 13-17)

As part of a project that looked primarily at critical success factors in enterprise wide information management systems projects, Sumner (2000) compared the experiences of seven companies implementing enterprise-wide information management systems using SAP, PeopleSoft, and Oracle. This led her identify the risk factors associated with enterprise wide information management projects as:

> Lack of adequate technology infrastructure
>
> Technological newness, strained technical capabilities, failure of technology to meet specifications.
>
> Lack of agreement on project goals
>
> Lack of technical expertise
>
> Lack of application knowledge
>
> Lack of user commitment, ineffective communications with users
>
> Lack of senior management involvement
>
> Application complexity (technical complexity)
>
> Misunderstanding requirements, changes in requirements
>
> Organizational environment (resource insufficiency, extent of changes)
>
> Unrealistic schedules and budgets
>
> Lack of an effective methodology, poor estimation, failure to perform the activities needed
>
> Changing scope and objectives
>
> Conflicts between user departments
>
> Inappropriate staffing, personnel shortfalls
>
> People and personality failures
>
> Lack of measurement system for controlling risk, inadequate project management and tracking.
>
> (Sumner, 2000, p. 182)

Many of Sumner's risk factors are related to poor project management, but they also highlight on ineffective communications with users, misunderstanding requirements and conflicts between user departments. The list is somewhat different to the other two already considered in that it implies that there is a need to ensure that the right information is discussed and that any misunderstanding around requirements can lead to failure.

Warkentin *et al.* (op cit) synthesized research regarding systems development risk factors to provide a framework that illustrates interactions between risk factors. Their analysis of the data led them to identify the following list of technical, resource constraints, organizational, and 'other' risk factors:

1 Inability to acquire necessary hardware
2 Inability to acquire necessary software
3 Inadequate hardware vendor support
4 Inadequate software vendor support
5 Project technical complexity
6 Technical incompatibility with existing systems
7 Technical incompatibility between new system components
8 System requires connectivity between multiple firms
9 Large size of project (large number of departments or users)
10 Large size of project team (large number of developers)
11 Insufficient or inappropriate staffing
12 Team's lack of skills or expertise
13 Team member communication or compatibility problems
14 Team instability
15 Project leadership problems
16 Lack of effective development process or methodology

17 Inadequate planning

18 Unclear or misunderstood scope or objectives

19 Changing scope or objectives during project

20 Inaccurate or vague user requirements

21 Organizational transition difficulties

22 Lack of user involvement

23 User expectations don't match project objectives

24 Conflict between user departments

25 Budgetary or financial constraints.

26 Lack of top management commitment to project

27 Organizational politics

(Warkentin *et al.*, 2004, p.12)

After undertaking their literature review and devising a framework to look at the interactions between risk factors, Warkentin *et al.* go on to emphasise the interdependency of these factors and discusses the problems associated with unclear or misunderstood scope or objectives, inaccurate or vague user requirements, and a lack of user involvement. Note however, that Warkentin *et al.* choose not to focus on the behaviour of the people involved in projects. They asked eight active industry practitioners to complete a questionnaire based on their list of factors and say that the responses received validated the synthesised list.

In a comment that seems to relate directly to shared understanding, Warkentin *et al.* say that a failure to communicate expectations clearly is an obvious risk:

> The feeling that senior developers provide guidance as opposed to technical solutions was also articulated through the observations that a failure to clearly communicate expectations is a clear risk as noted by informant #5 as he notes that

> (senior developers need to) understand what is desired by the clients and clearly communicate that to less senior employees. This supports the earlier theoretical assertion that team communications problems are a major SD risk factor. And there are consequences to clear communication as informant #4, a senior mid-level developer, and #7, a mid-level developer note: I have seen communication problems between users and developers. Often times, the users perceive the finished product as being something different than what they get. Of course... this happens within the team as well; where management and developers think they are on the same page when actually they are not.
>
> (Warkentin *et al.*, 2004, p.19)

There may be an added risk where the project is of a larger scale and has an increased number of communication paths, Slaughter *et al.* for example say that:

> As project size increases, certain aspects increase such as the complexity of interface requirements, the difficulty of testing and validating requirements, and the number of communication paths between developers.
>
> (Slaughter *et al.*, 2006, p. 896).

As part of research that aimed to develop an assessment of software development risk, Barki *et al.* (1993) canvassed project leaders and user representatives from 120 ongoing projects in 75 organizations. They note that despite the introduction and use of a wide variety of system development methods and tools, software projects are still plagued by time and cost overruns, and unmet user requirements. Barki *et al.* state that:

> Despite the introduction and use of a wide variety of system development methods and tools, software projects are still plagued by time and cost overruns, and unmet user requirements. To avoid these problems, it is frequently recommended that

> the risk associated with a software project be managed. A task that is critical to the proper management of software development risk is the assessment of the risks facing the project.
>
> (Barki *et al., 1993,(2),* p. 203)

Barki *et al.* suggest a method for assessing a way to measure the scale of risk but, in common with those of a number of other authors, their list does not venture too far in to defining how a manager might create some useful activity to counter some of the risks identified. This may of course be simply because they see this as something that lies firmly in the domain of the project practitioner. They do however provide a lengthy list of software development risk variables:

Need for new hardware
Need for new software
Number of hardware suppliers
Number of software suppliers
Number of users outside the organization
Number of departments
Degree of computerization of current system
Number of people on team
Relative project size
Team diversity
Number of users in the organization
Number of hierarchical levels occupied by users
Lack of development expertise in team
Team's lack of expertise with application
Team's lack of expertise with task
Team's lack of general expertise

Number of similar projects leader managed

Leader lack of familiarity with team

Dependence on a few key people

Lack of user experience and support

Project leader's experience

Technical complexity

Number of links to existing systems

Number of links to future systems

Extent of linkage to other organizations

Extent of changes

Resource insufficiency

Intensity of conflicts

Lack of clarity of role definitions

Task complexity

Top management support

Quality of software supplier support

Quality of hardware supplier support

Extent of changes in the project

(Barki *et al.* 1993 (2) p. 209)

The list is interesting as it highlights factors that are far removed from software itself, such as Project leader's experience, intensity of conflicts and quality of hardware support.

Curtis, *et al.* (1988) studied the problems of designing large software systems by interviewing personnel from seventeen large software projects. Each of the seventeen projects involved at least ten people; were past the design phase but had not yet delivered; and involved real-time, distributed or embedded applications. The resulting 97

interviews yielded more than 3,000 pages of transcripts. Curtis *et al.* say that the three most salient problems, in terms of the additional effort or mistakes attributed to them, were:

> (1) the thin spread of application domain knowledge
>
> (2) fluctuating and conflicting requirements
>
> (3) communication and coordination breakdowns
>
> (Curtis, *et al.* 1988, p. 1270)

Curtis *et al.*, drawing attention to, among other things, the need to negotiate an understanding during the development process go on to say that:

> Our interviews indicated that developing large software systems must be treated, at least in part, as a learning, communication, and negotiation process. Much early activity on a project involved learning about the application and its environment, as well as new hardware, new development tools and languages, and other evolving technologies. Software developers had to integrate knowledge from several domains before they could perform their jobs accurately. Further, as the project progressed they had to learn about design and implementation decisions being made on other parts of the system in order to ensure the integration of their components. Characteristically, customers also underwent a learning process as the project team explained the implications of their requirements. This learning process was a major source of requirements fluctuation.
>
> (Curtis, *et al.* 1988, pp. 1282-1283)

Curtis *et al.'s* comments relate directly to a (learning) process that would facilitate decision making, in an attempt to develop what appears to be a shared understanding, albeit one

that was subject to a level of fluctuation. In a paper that aims to identify the overlap between the definition of the project and project management and to discuss how the confusion between the two may affect their relationship, Munns and Bjeirmi (1996) say that success for a project is dependent on having:

- A realistic goal
- Competition
- Client satisfaction
- A definite goal
- Profitability
- Third parties
- Market availability
- The implementation process
- The perceived value of the project

(Munns and Bjeirmi, 1996, p. 82)

Munns and Bjeirmi say that:

> Only two of the items from this list would lie directly within the scope of project management as previously defined. These are the definitions of a goal and the implementation process
>
> (Munns and Bjeirmi, 1996, p. 82).

Munns and Bjeirmi describe the stages in a project life cycle, and the parties interested in each stage (see Figure 6). Note that the project team are not involved in the concept stage, implying that the output from that stage must be provided to the project team.

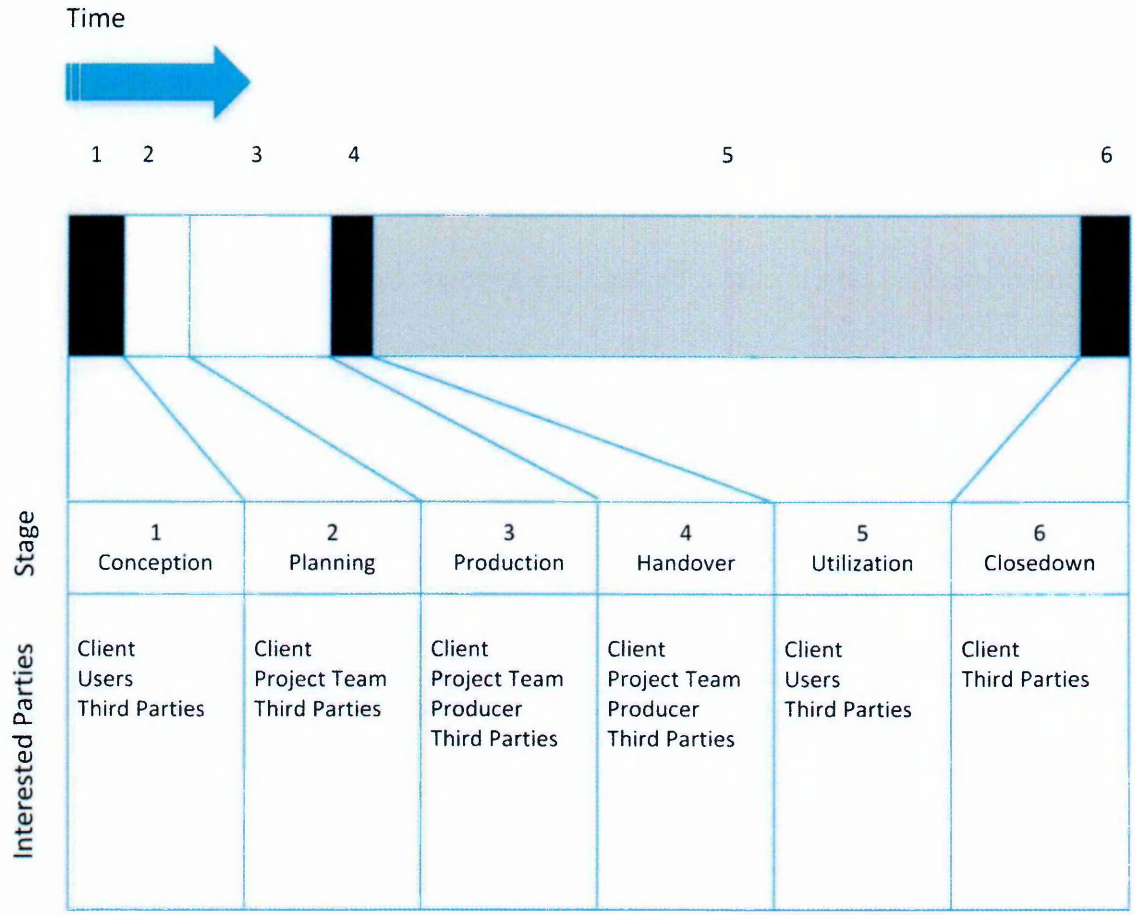


Figure 6: Stages in the project lifecycle, (Munns and Bjeirmi, 1996, p.85)

Could project management itself be the cause of failure? Williams points out that project management itself is based on three assumptions; project management is rational, the ontological stance is effectively positivist and the basis of project management is reductionist through decomposition (Williams, 2005, p. 500). This he says leads to three particular emphases; a heavy emphasis on planning, an implication of a conventional control model and an emphasis that project management is generally decoupled from the environment. Williams also asserts that project behaviour is complex, counterintuitive, and that the conventional discourse, and the resulting type of project management methods, can be inappropriate and potentially actually disadvantageous for projects that are characterized by three aspects: they are structurally complex, uncertain, and heavily time-limited. Projects which exhibit more of these three aspects are more likely to be inappropriately managed by conventional methods. (Williams, 2005, p. 505).

In order to maximise the probability of project success, areas of risk are routinely assessed in line with project management methodology procures and used, often in conjunction with CSFs to determine suitable countermeasures. The next section looks at commonly identified risks and how they are typically managed.

2.6 Risk

Risks may materialise at any time during a project, but by actively managing those risks – that is, introducing countermeasures of some kind - it may be possible to increase the probability of success. PRINCE2 (2009) says that 'Management of risk is a continual activity, performed throughout the life of the project' (p. 77). However, the literature does not appear to provide a single, standard list of risks that can be addressed and managed through to the successful completion of a project. Different authors describe differing lists of risks that should presumably be considered a checklist for consideration at the start and then throughout the project.

Boehm (1988), for example, in a paper that looked at the spiral model of software development and enhancement, discusses risks associated with software projects and provides the prioritised 'top ten' list of risks that is shown in Table 2.11. In this table, Boehm refers to the risks associated with communication in software development such as 'Developing the wrong functions and properties' and 'Continuing stream of requirements changes' and then suggests risk management techniques that include 'organization analysis' and 'mission analysis'. Boehm's list of techniques seem to point towards an approach that would seek to clarify some of the organisational and mission goals and presumably share these with project team members.

	Risk item	Risk-management technique
1	Personnel shortfalls	Staffing with top talent, job matching, team building, key personnel agreements, cross training
2	Unrealistic schedules and budgets	Detailed multisource cost and schedule estimation, design to cost, incremental development, software reuse, requirements scrubbing.
3	Developing the wrong functions and properties	Organization analysis, mission analysis, operations-concept formulation, user surveys and user participation, prototyping, early users' manuals, off-nominal performance analysis, quality-factor analysis.
4	Developing the wrong user interface	Prototyping, scenarios, task analysis, user participation.
5	Gold-plating	Requirements scrubbing, prototyping, cost-benefit analysis, designing to cost.
6	Continuing stream of requirements changes	High change threshold, information hiding, incremental development (deferring changes to later increments).
7	Shortfalls in externally furnished components	Benchmarking, inspections, reference checking, compatibility analysis.
8	Shortfalls in externally performed tasks	Reference checking, preaward audits, award-fee contracts, competitive design or prototyping, team-building.
9	Real-time performance shortfalls	Simulation, benchmarking, modelling, prototyping, instrumentation, tuning.
10	Straining computer-science capabilities	Technical analysis, cost-benefit analysis, prototyping, reference checking.

Table 2.11 A prioritized top-ten list of software risk items (Source: Boehm, 1988, pp. 61-72)

After studying the literature on risk contributors in software-intensive projects, Conrow and Shishido (1997) compiled a list of 150 'risk issues' that they aggregated and summarised, and is shown in Table 2.12.

Risk Grouping	Software Risk Issues
Project level	Excessive, immature, unrealistic, or unstable requirements Lack of user involvement Underestimation of project complexity or dynamic nature
Project attribute	Performance shortfalls (includes errors and quality) Unrealistic cost or schedule (estimates and/or allocated amounts)
Management	Ineffective project management (multiple levels possible)
Engineering	Ineffective integration, assembly and test, quality control, specialty engineering, or systems engineering (multiple levels possible) Unanticipated difficulties associated with the user interface
Work environment	Immature or untried design, process, or technologies selected Inadequate work plans or configuration control Inappropriate methods or tool selection or inaccurate metrics Poor training
Other	Inadequate or excessive documentation or review process Legal or contractual issues (such as litigation, malpractice, ownership) Obsolescence (includes excessive schedule length) Unanticipated difficulties with subcontracted items Unanticipated maintenance and/or support cost

Table 2.12 Implementing risk management on software intensive projects (Source: Conrow and Shishido, 1997, p.84)

At a project level almost all of the risk issues appear to be related or closely align to establishing an understanding of what the project was to deliver. They also set out several additional risk issues that can contribute significantly to increased costs and schedule slippage for moderate and high-complexity development projects. These are:

- Using a performance-dominated requirements generation process that begins before you formally start your development process,
- Starting a project with a budget and schedule that is inadequate for the desired performance level,
- Using a performance-driven design and development process,
- Establishing a design that is near the feasible limit of achievable performance (where the magnitudes of the first and second derivatives of cost with respect to performance can be very large),
- Being overly optimistic in assessing the limits of performance achievable fora given budget and schedule, and
- Making major project design decisions before the relationship between cost, performance, and schedule is understood.
- Each of these items generally contributes to
- Over optimism in establishing and estimating adequate project cost and schedule,
- Underestimation of cost and schedule risk, and an eventual increase in project cost and schedule during development.

(Conrow and Shishido, 1997, p. 84)

They go on to discuss an area of risk associated with requirements and describe how it was dealt with in a project to develop a large software intensive command and control system:

> *Excessive, immature, unrealistic, or unstable requirements.* Prior to starting this project, this risk was one of the main reasons TRW's large software-intensive projects experienced cost overruns and schedule slips. To address this major risk area, we used the TRW Ada Process Model. With this process model, you specify

not just your current project requirements, but plan for their likely directions of growth and change.

(Conrow and Shishido, 1997, p. 87)

Note that although they had identified requirements as an area of risk, it appears that they had accepted this risk as inevitable and had adopted an approach that dealt with changes as they occurred rather than trying to reduce them, or attempt to remove them completely.

In an analysis of risk components and performance on software projects, Han and Huang (2007) discuss risks in the creation of software and devise another 'top ten' list of risks :

1. Continually changing system requirements
2. System requirements not adequately identified
3. Unclear system requirements
4. Lack of an effective project management methodology
5. Incorrect system requirements
6. Poor project planning
7. Inadequate estimation of required resources
8. Project involved the use of new technology
9. Project progress not monitored closely enough
10. Corporate politics with negative effect on project

(Han and Huang, 2007, p. 48)

Risks one to three are specifically in the domain of requirements definition and seem to imply that these requirements were not well understood and underwent several iterations to arrive at an understanding that reflected the user's needs. The risks identified in the

publications cited above are broadly similar in nature. Han and Huang however, also say that having a list in isolation is not enough, and that:

> Achieving effective software risk management requires project managers to understand the nature of software risks. Thus, information about the probability of occurrence and impact of software risks on project performance can help the project managers to develop a better risk management strategy.
>
> (Han and Huang, 2007, p. 48).

Having looked at the topic of why projects fail where software forms a significant part of the finished system, it is clear that a number of problem areas are related to each other . This is particularly true of those involving communications and requirements definition. For example, the Royal Academy of Engineering (2004) mention a lack of effective engagement with stakeholders (p. 10) and Charette (2005) discusses unrealistic or unarticulated project goals badly defined system requirements and poor communication among customers, developers and users (p. 45). Zowghi and Coulin say that:

> One of the main problems facing software development project teams is communication barriers and agreement about requirements, as concepts that are clearly defined to one community of participants can be entirely opaque to another.
>
> (Zowghi and Coulin, 2005, p. 20)

In a similar vein, Sumner (2000) lists agreement on project goals, ineffective communications with users, misunderstanding requirements, changes in requirements and conflicts between user departments (p. 185) whilst Warkentin *et al.* (2004) talk about a lack of effective development process or methodology and user expectations that don't

match project objectives (p. 19). In a research paper that discusses the creation of information systems, Brooks (1987) asserts that:

> Software is invisible and unvisualizable... and the hardest single part of building a software system is deciding precisely what to build. No other part of the conceptual work is as difficult as establishing the detailed technical requirements, including all the interfaces to people, to machines and to other software systems. No other work so cripples the resulting system if done wrong. No other part is more difficult to rectify later. The most important function that the software builder performs for the client is the iterative extraction and refinement of the product requirements.
>
> (Brooks, 1987, p. 17)

It can be argued that a prerequisite for the discussion and definition of how to best proceed towards a future state is shared understanding of what that future state needs to be and how it will appear to the observer. In a paper that looks at the process of requirements engineering, Jarke *et al.* say:

> The decomposition of monolithic business processes or product architectures (e.g., in cars) into more loosely configurable business services (or modules) has turned out to be a far more complex task than anticipated due to the need to make semantics explicit that were hitherto hidden in the code, or people's heads.
>
> (Jarke et al., 2011, pp. 1006-1007)

In saying this, Jarke *et al.* seem to imply that making something explicit must mean that the message is transferred effectively and that it is understood. In a study that examined the emergence of shared understanding and the application of functional pragmatics to

study the requirements development process, Charaf *et al.* (2013) discuss processes of communication within information system development projects:

> Many traditional approaches rely on means of formal communication such as specification documents. But in rapidly changing environments, it is hard to react quickly using formal communication. By contrast, agile ISD methodologies rely on intensive face-to-face communication and are often suggested as a solution to these challenges. However, these approaches can also be overwhelmed by 'over'-communication.
>
> (Charaf *et al.,2013,* p. 130)

They add:

> successful knowledge transfer, mutual understanding, and communication are major factors that affect ISD success.
>
> (Charaf *et al.,2013,* p. 117)

Is the answer simply a matter of adopting agile methods, or would these methods inherit exactly the same problems associated with developing shared understanding? Cao *et al.* (2009) look specifically at the use of Agile methods. They say:

> These Agile methods rely heavily on tacit knowledge embodied in development teams. All team members colocate in the same room. Stand-up meetings among team members take place daily. Critical decisions may be left undocumented. There is a lack of formal history of the project for team members to trace and understand the evolution of the system. Communication strategies adopted by agile methods work well for small, highly cohesive teams. However, their use in large, complex projects may result in several challenges. Informal communication

> may not be effective when dealing with a large number of stakeholders and vast amounts of information.
>
> (Cao *et al., 2009,*p. 333)

Agile techniques may not provide, as Brooks puts it, a silver bullet. Returning to the list of CSFs created by Fortune and White (2006) for a moment, it can be seen that the six highest ranked CSFs (support from senior management, clear realistic objectives, strong/detailed plan kept up to date, good communication/feedback and user/client involvement) have a common factor. They have a requirement for shared understanding between those working together to design, develop and deliver a large information system. Considering these CSFs, it is obvious perhaps, that senior management may not support something that they do not understand in the same way as another project team member. Similarly it is clear that plans must provide enough detail (and a narrative) that allows all project team members to form a consistent and coherent understanding of the way forward and act in a harmonious manner. Clear objectives and good communication both imply strong similarities in the perceptions and understandings of project participants about the aims of IS programmes and component projects. Should those participants fail to establish an effective shared understanding it is likely that these CSFs will not be satisfied.

One objective of project management methods is to overcome the potential pitfalls of a lack of shared understanding. The use of formal methodologies to organize and manage the design, development and execution of projects is well established and well documented; see, for example, White and Fortune (2002). Over the past couple of decades the development of these methods has run alongside increases in the size, scope and complexity of information systems and the desire for them to achieve increasingly ambitious aims. Varying degrees of flexibility about *how* a project is to be

achieved are allowed within these methods but central to any formalised approach to project management is the notion that an understanding of *what* is to be achieved is agreed and shared by the various stakeholders, and in particular by the members of the team that is tasked with designing and building it. For example, commonly deployed methods such as PRINCE2 (OGC, 2009) assume that a shared understanding is negotiated and documented that describes a manageable route to a solution to the business problem and also, based on the project mandate and brief, a shared understanding in at least broad terms of what the solution will look like. Similarly, Dynamic Systems Development Method (DSDM Consortium, 2008) emphasises the need to understand the business priorities and the business case and acknowledges that achieving a shared understanding is problematic. However, in the delivery of large-scale information systems, one (of several) recurring themes is the difficulty associated with creating and sharing an understanding of both the desired business outcome and the system that should be created in order to support those outcomes. The role of formal methods in project management is not without its issues. Walsham notes:

> An exercise using formal procedures may have overt or covert functions from the perspective of different stakeholders, and in some cases can be viewed as a ritual, expressing for example symbolic belief in management competence. However, in all cases, the social context of the use of formal procedure includes the informal assessments of individuals and stakeholder groups, reflecting their own set of perceptions and rationalities.
>
> (Walsham, 1993, p. 236)

Nevertheless, the declared aim of such methods is to reach and retain a shared understanding of the task at hand. Developing and maintaining a shared understanding of the undertaking itself is by no means limited to the domain of information system projects. The task of defining and then implementing business change is equally

dependant on having a shared understanding of what the business will look like and how it will operate following the completion of the change. The stakeholders involved in the management of the change in business practice must seek to create a shared understanding or each individual may work towards the creation of differing business processes or outcomes that may or may not correlate with that set out by the business change owner. Interestingly, when discussing how cognition may shape industry specific evolutionary paths, Rant (2008) suggests that 'the cognitive systems of organizations transcend those of the individuals that populate the firm, and that top-level managers are the key mechanism in organizational interpretations...'. (P. 9). If that is the case then it would be of some advantage to determine one or more approaches that would minimise the risk of differing cognitive models causing a discord in the way that the business change is perceived.

Discussing business process modelling, Melão and Pidd (2000) discuss static approaches to describing a business process, but note that they lack a time dimension and, if used in isolation, may ignore socio-political issues. They also add 'a business process may be viewed from different and competing angles – deterministic machines, complex dynamic systems, interacting feedback loops and social constructs' (p.121). This seems to suggest that where a business transformation project is sought, it could be subject to the same problems associated with Information Systems projects, where the social aspects of individual cognitive appreciation cannot be ignored.

Other qualitative and quantitative approaches to determining the level of shared understanding in a project are the subject of wider research. Carrying out a survey is a well-known technique for measuring shared understanding, where members of a team are asked about their shared work, such as project objectives, goals, tasks and activities or about each other, such as knowledge and expertise in different project related areas. Responses from the team members may then be compared (typically using a Likert scale)

and can be analysed using various statistical and interpretive techniques. Surveys capture and compare perceptions of team members and are not structure based. Concept mapping is a structure based visual technique that creates a diagram that describes concepts with lines drawn between them to signify relationships and represent knowledge structures. The information built up by the concept map facilitates analysis. Relatedness ratings is another example of a structure based technique that forms pairs of concepts that are used with team members to identify how closely their understanding of the pairs align. Analysis may be carried out in a similar fashion as concept mapping, allowing the identification of important relationships, concepts that are of interest and similarity.

Braunschweig and Seaman (op cit) discuss potential issues regarding the concept mapping technique, suggesting that as well as being too dependent on the visualization skills of the team members, concept maps may be confused with class diagrams, possibly leading to confusion. They have recently developed an instrument for measurement of shared understanding in software projects that might have wider applicability. They based their approach on relatedness ratings, combined with Pathfinder analysis, and to extend this to provide concept similarity measurements. While acknowledging that their study may be limited because it took place in an environment that could not mimic an industrial setting, they presented a technique that will allow:

> measuring of the degree of shared understanding in the design team and, further, help identify concepts in agreement, concepts in conflict, complementary knowledge, and lack of knowledge among the team members.
>
> (Braunschweig and Seaman, 2014, p. 9).

This technique may offer project practitioners a tangible and practical approach above and beyond the survey as a tool to measure shared understanding, but as the authors acknowledge requires further research before it can become a widely used approach.

2.7 Literature review - conclusions

The literature review began by examining the history of project management, highlighting the relatively recent development of project management associations and their laudable intentions of sharing information via conferences, seminars, journals and magazines. The literature highlighted how the development of these project management associations led to the situation where they became the de-facto custodians of project management standards (as they saw them) and in the process launched a multi-million pound industry fulfilling the training and accreditation needs of an ever growing project management community. The literature surprisingly (to this author) showed that any link between a theoretical foundation and the development of project management methodologies and techniques was conspicuous by its absence. In terms of validity regarding the fundamentals of project management theory, some commentators have noted that despite there being an extensive body of knowledge, it is not based on a series of premises from which a strong, consistent theory is derived, but rather more on conjecture. If it is the case that theoretical foundation is missing, perhaps the situation is changing as it was noted that more research is being called for in this area.

The literature offered up some debate regarding the perceived history of project management. In some research papers, specific projects are held up as early and renowned episodes of formal project management. Others say that these same projects were not carried out in anything like a manner that could be compared to project management in recent times. In literature that attempted to take perhaps a wider view, some have pointed to a puritanical or protestant influence that has made its mark in modern project management thinking by suggesting that there is, a single, positivist, 'true way' that must be derived in order to manage projects to a successful conclusion.

Whatever the reality behind the early years of project management it is evident that there is no shortage of approaches, methodologies and techniques available to the project

manager today. Structured methodologies are by default the mainstream approach to the way that organisations manage change, in the belief (or hope) that project management will maximise their chances of success. Publishers of methodologies such as PRINCE2 make claims about their suitability and often provide accreditation or training services in addition to the definition of standards. The literature suggests though that there are reasons to have some reservations regarding these methodologies; research suggests that the project management track record for public sector organisations is poor (even though they have these methodologies available to them). There is some (albeit limited) criticism of the methodologies regarding their suitability for a particular type, scale or timescale of a project. Others go further and suggest that the methodologies actively reduce the ability of the project manager to manage and some even assert that the methodologies themselves can be a contributing factor towards project failure.

If this is the case why would an organisation chose to make use of methodologies where there are doubts regarding their value? In the United Kingdom the PRINCE2 methodology is not only free to use but widely mandated in the public sector for use in IS projects. It might be the case that even if PRINCE2 was thought to be ineffective by project managers in this sector, it would be unlikely that they would be thought of as wise to have rejected the use of the methodology should their project return what are considered by some to be less than acceptable results. Perhaps the fact that projects are by definition one-off endeavours that have little in the way of certainty, convinces those with the responsibility for organisational IS change to grasp whatever management lifebelt is available to them.

The literature is clear in describing how information systems projects are complex and difficult to achieve. There is a high level of uncertainty to overcome in projects of this kind and the literature says that this will involve many team members as it will usually not be possible for a single person to deliver all of the project's outputs within a given timescale.

A common theme in the literature says that projects are complex, ambiguous and confusing and the critical factors of complexity and multiple project team members must be dealt with in this context, if the project is to be successful. The literature review discussed how project teams must interact cooperatively and adaptively in pursuit of shared value objectives, and it illustrated that a fundamental building block for the use of project management methodologies, tools and techniques must be shared understanding; each project participant must have an understanding of what is expected, and this understanding must be equally shared by all other participants unless their role is trivial or peripheral to the delivery of the main project components. While noting that some argue that it is not possible to create a clear exogenously defined goal and that it is futile to attempt to do so, it is a basic tenet of this thesis that one of the project management methodology objectives should at least be to work towards the best possible shared understanding that is possible. The literature consistently states that it is difficult to investigate shared understanding and it is poorly understood, with little in the way of agreement or consistency about how to measure shared cognition (or shared mental models). That is not to say that there is no literature in this area; some researchers have looked at shared understanding, acknowledging the need to treat information systems projects as a learning, negotiation and communication process and others have attempted to develop theory related to shared understanding. Shared understanding is held to be a major factor in the delivery of information systems and would therefore be essential as a foundation upon which project management methodologies stand and operate. Looking at critical success factors, it is clear that a significant amount of research work has driven the development of CSFs over the past few decades, but it is not clear that CSFs provide solutions that might form a part of the project manager's toolkit. CSFs are difficult to use in isolation and are not particularly transferrable as specific factors, between projects. The CSF research is consistent however in illustrating that communication and clarity of requirements regularly appear towards the top of many CSF lists. This is a subject area

that is closely related to the area of shared understanding and confirms the importance of shared understanding in these specific areas.

A single definition of shared understanding itself is difficult to determine in the literature and it is evident that it is also known by a range of differing terms such as shared knowledge, shared mental models and shared cognition. However shared understanding is described, the literature is clear in acknowledging that shared understanding is essential and will enhance team performance by allowing those teams to coordinate and make predictions about the behaviour and needs of their teammates.

The discussion in the literature review included the possibility that shared cognitive experience is a key factor, or the characteristics of the personalities of the people involved may be a strong influence. It was evident that future research in shared mental models is recognised as key to exploring the influence of these factors. Other factors may be linked to the basic position of each participant in relation to how they perceive and regard the information system around them. People may see the domain in different ways; as an area where they can act as a technical expert, as a facilitator, or as an opportunity to make a change related to prestige and power or perhaps to have an impact from a social perspective.

The discussion in the literature review suggests that cultural factors will play their part and these factors are often addressed by formal management procedures such as strategy frameworks, evaluation methods, or design and development methods. However they are used, the social context of the use of these procedures includes the informal assessments of individuals and stakeholder groups and these will reflect their own set of perceptions and realities.

The literature review recognises that qualitative and quantitative approaches to determining the level of shared understanding are under development with some researchers reporting newer methods in addition to a simple survey. Concept mapping for example provides a structured, visual technique that describes concept relationships and represent knowledge structures in a format that facilitates comparative analysis. Relatedness rating is another structured approach that assembles concept pairs so that an understanding can be created of how well each pair aligns. There is evidence then that techniques are emerging or available to managers should they chose to assess shared understanding in whatever undertaking they are involved.

The literature is clear in identifying the importance of shared understanding but little or no research has been undertaken into the level of shared understanding in a live project environment. It is also clear that project management has not moved to incorporate any techniques that would confirm its presence or not in a live project. The literature review identified a clear gap that could be addressed by this research, regarding the level of shared understanding in a typical, live information systems project

Chapter 3 The research question and the methodology

3.1 Research question

It was clear from the literature review that very little research had been undertaken to examine the concept of shared understanding during the execution of a large IS project. Most of the research studies into the efficacy of information system (IS) development have been conducted in retrospect i.e. after the systems have been implemented (or possibly just abandoned). Because of this certain aspects of IS development are under-researched or under-evidenced, particularly those that rely on the post project recall of those involved. End-of-project reviews (also known as 'after action reviews') usually seek to cover major activities and milestones, often with a view to improving risk identification or critical success factors in the future, and so focus on material that should be relatively easy to recall. In addition, as Kransdorff (op cit, p. 11) points out, even end-of-project reviews are susceptible to the 'characteristic partial and selective memory recall by managers who, after the event, are rarely neutral or objective'. As a consequence, not only are certain aspects of IS development under-researched or under-evidenced, particularly those that rely on the memory of those involved but also there are dangers that participants' perceptions about the project are coloured by their knowledge of the success or otherwise of the way it was conducted and its outcomes.

The review of scholarly literature raised questions regarding the way that each individual person involved in a project understands the current or future position of the project (where it includes the delivery of a software system). Perhaps unsurprisingly, many publications pointed to critical success factors (CSFs) associated with the general topic of project communication such as the 'setting of clear realistic objectives' and 'good communications'. For example, in their study of 63 publications, Fortune and White (2006) found that 'clear realistic objectives' and 'good communications' came second and fourth respectively in the list they compiled of the most commonly identified critical success factors, thus confirming that they are two of the most important factors associated with the successful management of information systems projects. It was considered that

the ability to consistently envisage (visualise) or create a future envisagement (visualisation) of a yet to be built environment, with all of its complexity, where an individual's cognitive process has such an influence on their view of the world might be challenging. If this is so, is it possible for individuals to share a consistent and coherent understanding of a present or future state? With due regard to the literature review, and the guidance on formulating research questions detailed below, the following, single research question was formulated:

> *During a large project, what level of coherence and consistency is apparent in key actors' perceptions of the current endeavours and envisaged end state?*

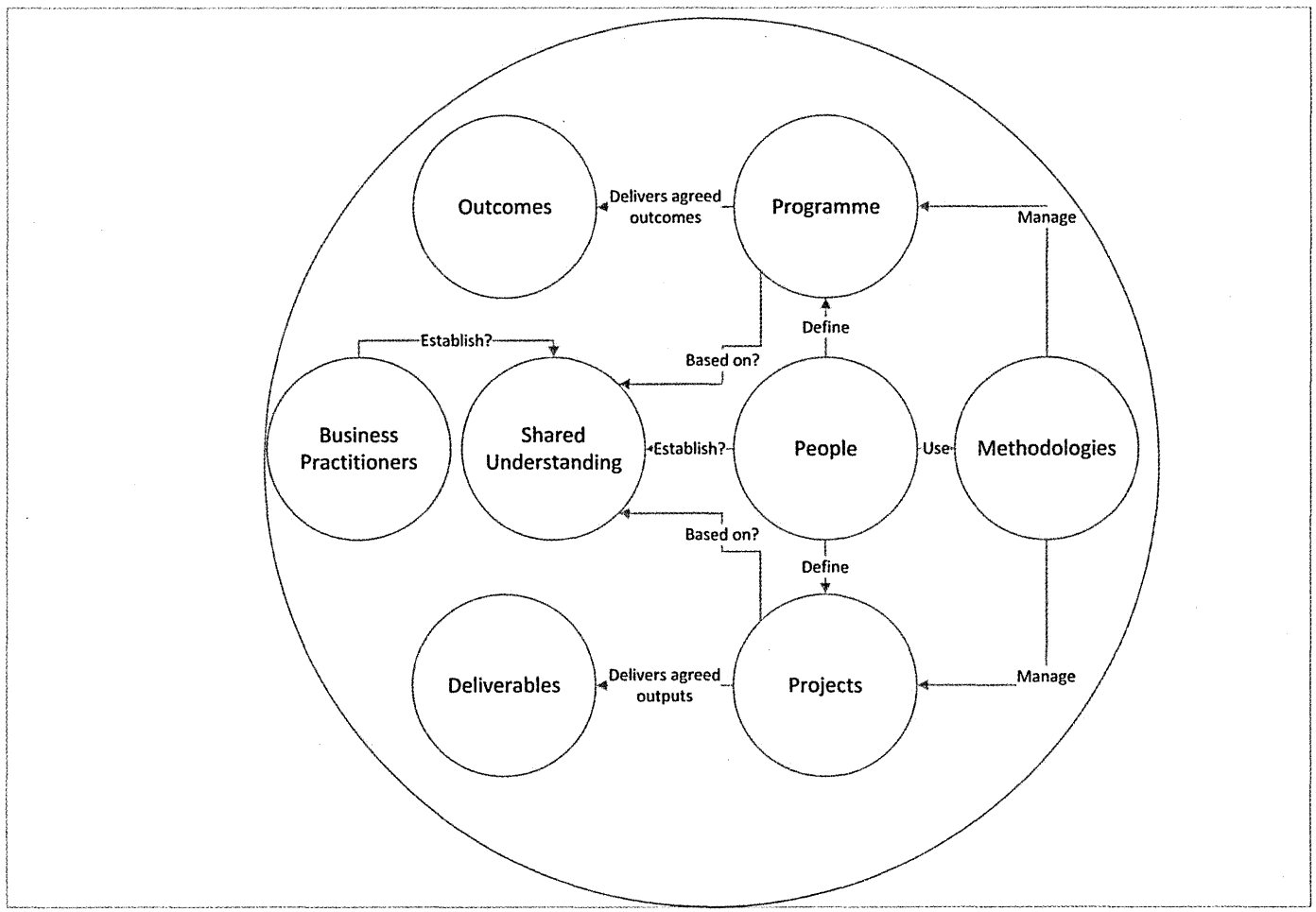
3.1.1 Further background to the formulation of the research question

Miles and Huberman (1994) offer advice on the creation of a suitable research question. In addition to some suggestions such as starting with general research questions, refining the question as you go along and keeping the number of questions down to one or a small number, they say that it is important to ensure that everyone understands the research question, that it is researchable and to keep reviewing the question during the fieldwork. Strauss and Corbin (op cit) suggest that the research question may start as a broad, open question but not so open as to allow for the entire universe of possibilities and not so narrow as to exclude discovery. Bazeley (Bazeley, 2013) says that the questions that are developed from a conceptual framework for the study are key to focussing data collection and for developing an approach to analysis, guiding what is relevant and not relevant throughout the data gathering and analysis periods. Strauss and Corbin (1990) describe three potential sources for the research question. The first is the suggested or assigned research problem where typically suggestions will be sought from a professor working in a particular field. The second is technical literature that points to relatively unexplored areas or provides an indication of contradictions or ambiguities that need further investigation.

The third is personal or professional experience where, for example, someone may encounter a problem in his or her workplace or profession for which there is no known answer.

The research question addressed in this thesis originates from a combination of all three of these sources and refined using guidance from Miles and Huberman (op cit). They suggest that a conceptual framework can help to identify the main 'intellectual containers' (also referred to as topics) that might be considered during the research project so that they can be used to develop the research question. Such a conceptual framework explains either graphically or in narrative form the main things to be studied – the key factors, constructs or variables – and the presumed relationships between them. The literature review in this research suggested that a number of topics appeared to be interrelated and that it would be worthwhile building such a model for the purposes of exploring a potential research question. From the experience of this author, the themes of project management and understanding project outcomes continue to be subject to some debate within the project management community. The findings of the literature review echoed these themes and suggested others that are worthy of consideration because they appear to be linked to them. Building a conceptual model (Figure 7) helped to focus attention on the important components in the area of interest and the relationships between them and thus assisted the development of the research question addressed in this thesis.

Figure 7: Conceptual model created at the beginning of research stage



A programme would be subject to the scrutiny of the programme manager in order to maximise the probability of achieving predetermined benefits and outcomes. Predetermined, in that the outcomes would be defined and agreed by those involved so that they work towards the same, correct outcome. A project, while being regarded in this thesis as broadly equivalent to a programme, may be defined as: 'a management environment that is created for the purpose of delivering one or more business products according to a specified business case' (OGC, 2009 p. 3). The product (or deliverable) is defined at the early stage of each workpackage by those involved, so that those people involved may work towards the same, correct output. Both programmes and projects are described as an end state (or end goal) with appropriate controls to ensure their delivery. Defining, documenting and communicating these 'end states' is regularly initiated and managed via the project management methodology that may or may not do so via a particular specialist technique. Information systems are built for a purpose and this is usually at the behest of business practitioners (the business owners) and they will have an outcome in mind that the system will support through its operation. The project manager is involved in creating a temporary environment that will facilitate the process of defining, creating and implementing systems with the involvement of stakeholders. The way that each stakeholder understands the problem situation and the end state will be crucial or they may inadvertently be working towards differing outcomes. Of particular significance for this research, it is clear that project management methodologies are underpinned by at least a tacit assumption that each individual will have an understanding of what is required and will be able to describe requirements and the future operation of the information system based on that understanding; further there might be another, unexplored assumption that the understanding held by each person would be the same. These assumptions potentially provide an exciting and interesting starting point for the formal definition of the research question. In other words, the simple model provided the starting point for discussing and exploring whether the people involved in a project had established shared understanding. Although it is accepted that shared understanding

should not be limited to stakeholders inside the project group this research is confined to shared understanding between project team members only. The conceptual model was developed to explore elements of the research. The model provided a direct input to the creation of the research question.

3.2 Research philosophy

An essential element of a research project is definition of the fundamental philosophical approach of the researcher. A starting point might be a definition of the underlying epistemology that guides the research. Two main research paradigms or philosophies should be considered: positivist and phenomenological. Epistemology refers to the assumptions about the theory of knowledge and how knowledge can be obtained. Orlikowski and Baroudi (1991) examined more than five years of published information systems literature from between January 1983 and May 1988 and suggest that there are three underlying philosophical paradigms for qualitative research: positivist; interpretivist; and critical. Table 3.1 shows the splits between these categories into which the articles they reviewed fell.

Epistemology	Frequency	Percent
Positivist	150	96.8
'descriptive'	(37)	(23.9)
Theoretically grounded	(113)	(72.9)
Interpretive	5	3.2
Critical	0	0
	155	100 per cent

Table 3.1 Underlying philosophical paradigms (Source: Orlikowwski and Baroudi, 1991, p. 3)

It is interesting to note that although this paper identified just 3.2 per cent taking an interpretive approach and none taking a critical approach, it still thought it was important to distinguish these three philosophically distinct epistemological types. This may of course just reflect the nature of research approaches at that time, but it does at least confirm that an interpretive approach was in use at that time. Orlikowski and Baroudi (op cit) explain that interpretive studies assume that people create and associate their own subjective and intersubjective meanings as they interact with the world around them. Interpretive researchers thus attempt to understand phenomena through accessing the meanings that participants assign to them. In direct contrast to 'descriptive' studies,

interpretive studies reject the possibility of an 'objective' or 'factual' account of events and situations, seeking instead a relativistic understanding of phenomena. The intent then, is to understand the deeper structure of a phenomenon, which it is believed can then be used to inform other settings.

Walsham (Walsham, 1995) notes that interpretive methods of research adopt the position that our knowledge of reality is a social construction by human actors and that value-free data cannot be obtained, since the enquirer uses his or her preconceptions in order to guide the process of enquiry. He says that interpretivism contrasts with positivism, where it is assumed that the 'objective' data collected by the researcher can be used to test prior hypotheses or theories. Walsham also discusses how Interpretivism represents one strand in information systems research, and how, although it has been dominated in terms of quantity of publications by positivist approaches there are signs that interpretivism is gaining ground, and the epistemological choice between interpretivism and positivism is an important issue for IS researchers.

Quantitative research methods were originally developed in the natural sciences to study natural phenomena. Examples of quantitative methods now well accepted in the social sciences include survey methods, laboratory experiments, formal methods (e.g. econometrics) and numerical methods such as mathematical modelling. Qualitative research methods were developed in the social sciences to enable researchers to study social and cultural phenomena. Examples of qualitative methods are action research, case study research and ethnography. Qualitative data sources include observation and participant observation (fieldwork), interviews and questionnaires, documents and texts, and the researcher's impressions and reactions.

WenShin Chen and Rudy Hirschheim (2004) examined 1893 articles published in eight major IS publication outlets between 1991 and 2001. They found that positivist research

accounted for 81 per cent of published empirical research and highlight how the positivist paradigm could support aims associated with replication and generalisation, and how on the other hand the interpretivist paradigm could enhance the in-depth understanding of the phenomenon examined. They also say that each paradigm provides unique attributes for different purposes of scientific inquiry; the same argument could also be applied to each methodology. They make the point that alternative paradigms or methodologies such as Interpretivism and qualitative methods should be welcomed and encouraged because they provide different dimensions for research investigation that the positivist paradigm and survey methods would not be able to accomplish.

Easterby-Smith *et al.*'s (1991) summary of the attributes of positivist and interpretivist philosophies is shown in Table 3.2.

	Positivist Philosophy	Interpretivist Philosophy
Basic Beliefs	The world is external and objective	The world is socially constructed and subjective
	The observer is independent	Observer is part of what is observed.
	Science is value free	Science is driven by human interests
Researcher Should:	Focus on facts	Focus on meanings
	Look for causality and fundamental laws	Try to understand what is happening
	Reduce phenomenon to simplest elements	Look at the totality of the situation
	Formulate hypotheses and then test them	Develop ideas through induction from data

Preferred methods include:	Operationalising concepts so they can be measured	Using multiple methods to establish different views of phenomena
	Taking large samples	Small samples investigated in depth over time

Table 3.2 Attributes of positivist and interpretivist philosophies (Source: Easterby-Smith, Management Research: An Introduction, 1991, p. 27)

Interpretive research then is a perfectly valid approach to take in the context of this study. It is acknowledged that the researcher will have an impact on the research as they will create and analyse data in a social context, and that it is important to ensure that this position is understood from the start. It is acknowledged that the researcher is fundamentally the research 'vehicle' and involved in the complete research lifecycle from definition of the research question, through data capture and on to analysis and sense-making. This would be true whether a positivist or interpretive approach was taken. It is merely that it is formally recognised in the interpretive approach and accepted that data is captured and processed according to a particular and specific personal standpoint. During this study great effort has been made to identify any potential bias, undue bearing or doctrine linked to this by taking a very rigorous and logical approach to ensure that any interpretation is based on the data and information captured in the study. Collis and Hussey (2003) explain that the interpretive approach offers a number of compatible methodologies: action research, case studies, ethnography, feminist perspectives, participative enquiry and grounded theory. A decision on what methodological approach to take would be taken during the creation of a detailed research plan. Myers (1997) describes qualitative research methods and says that it should be clear that the word 'qualitative' is not a synonym for 'interpretive' - qualitative research may or may not be interpretive, depending upon the underlying philosophical assumptions of the researcher. Myers goes on to say that interpretive researchers start out with the assumption that

access to reality (given or socially constructed) is only through social constructions such as language, consciousness and shared meanings. The philosophical base of interpretive research is hermeneutics and phenomenology and interpretive studies generally attempt to understand phenomena through the meanings that people assign to them; Myers says that interpretive methods of research in IS are 'aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context'. Because this research is underpinned by the ontological assumption that the world is socially constructed and better understood by examining the perceptions of the human actors, rather than being objective and external to the researcher, it is carried out using a qualitative approach. The study, described in this thesis looks at how the people involved in a single project shared an understanding of what they were doing at the time and what the end state would be. The data that is used to fulfil that purpose and the analysis upon which the conclusions are drawn are more suited to an approach based on an interpretive paradigm. To reiterate then, the approach taken in this research has been based on an interpretive philosophical view of the world, predominantly because the world is socially constructed and subjective, but also because an important objective of the research is to focus on meanings and attempt to understand what is happening as part of a holistic approach that examines the totality of the situation that is under examination.

3.3 Research methodology

To sum up the previous section, the starting point for the selection of a research methodology described in this thesis was to consider if in general, a positivist or interpretive approach might be best placed to serve the aims of this research project. At first it might be assumed that as the research was seeking to show if an understanding was shared by a number of people in a project, an approach that recorded objective, fact-based yes/no responses may be suitable. On the other hand, an approach that tried to see the research question from the point of view of understanding human behaviour from the participant's own frame of reference might be more appropriate.

To return to the research question:

> During a large project, what level of coherence and consistency is apparent in key actors' perceptions of the current endeavours and envisaged end state?

Ideally, in order to answer this question, data would have to be gathered from people who were taking part in a live project. Asking people to look back at a recent (or older) project would not provide the data that would satisfy the research question as it would by definition be gathering data that would depend on their recollection of understanding, rather than extant understanding. The fundamental requirement of addressing the first part of the question i.e. 'during', could only be fulfilled by undertaking fieldwork in a live project, with project participants while their involvement was still current. To this end fieldwork was selected as the main plank of this research. Fieldwork was also selected for the reason that, compared to a survey, it would be easier to secure the time and input of project staff by direct engagement and it would sidestep the growing problem associated with eliciting a survey response from staff who are already under considerable pressure to spend time on such surveys. Even in the context of the project examined (see next subsection), the opinion of management in the organisation where the fieldwork would take place was that it would be unlikely that a satisfactory response rate would be

obtained by survey, as prior history indicated that they simply would not be completed. Although some people would respond, it would be difficult to ensure that there was a representative set of results from a survey alone. This view is supported by Shehu and Akintoye (2010) who say that their experience of receiving back just 119 responses (9 per cent of 1380) to a survey illustrates that given the increasing number of research projects, collecting data is becoming progressively more difficult. They say that respondents are being targeted with many requests for data and they are subsequently becoming unwilling to spend a lot of time on them and ultimately refusing to participate in academic surveys. In any case some interviews would be required before a survey could be constructed and in the case of this project the number of interviews was deemed to be of a reasonable size the task of interviewing itself was not seen as onerous. Interviews were therefore viewed as a very suitable option. Fieldwork would also offer the chance to capture information and comments from participants so that a richer picture of understanding in the project could be pieced together. Corvera *et al.* (2013) say that while the importance of communication is generally acknowledged, and while the existence of the communication gap seems to be a truism, studies investigating these phenomena are scarce. By carrying out fieldwork to answer this question it was hoped that it would generate findings that would contribute to a better understanding of the extent to which members of a project team share a consistent view of the current state and visualisation (envisagement) of the end state for which they are aiming during their involvement in a large scale, complex, enterprise wide system development project. The intended long term benefit of the research was to move towards a better understanding of aspects related to shared understanding in a project (that includes some form of software system) that would have the potential to improve the management of the risks associated with such projects.

3.4 Ethics

Velasquez (1997) *et al.* say that ethics refers to well-founded standards of right and wrong that prescribe what humans ought to do, usually in terms of rights, obligations, benefits to society, fairness, or specific virtues. Secondly, ethics refers to the study and development of one's ethical standards. Easterby-Smith *et al.* (2012) list the key principles in research ethics:

Ensuring no harm comes to participants

Respecting the dignity of research participants

Ensuring a fully informed consent of research participants

Protecting the privacy of research participants

Ensuring the confidentiality of research data

Protecting the anonymity of individuals or organisations

Avoiding deception about the nature or aims of the research

Declaration of the affiliations, funding sources and conflicts of interest

Honesty and transparency in communication about the research

Avoidance of any misleading or false reporting of research findings

Throughout this research the utmost care has been taken in order to follow the guidelines listed above as well as answer our research question. The Open University document *Ethical decision making in social research (2009)* based on Iphofen's *A practical guide (2009)* was used to assess the practical issues associated with carrying out research in an ethical manner. The guide includes a number of assessment criteria, for example potential causes of harm to interviewees:

Examples of harm: rate as - Possible / Unlikely

- Psychological — Lowered self-esteem; emotional distress; embarrassment; misperceptions of the research purpose could raise false expectations of gain to participants.
- Physical — Illness/accident consequent on participation in study.
- Social — Unwarranted exclusion from society; ostracised by neighbours/friends/family/significant reference or peer group
- Economic — Economic deprivation as consequence of answering questions.
- Legal — Legal penalties ensuing from answering questions in the interview

And also to consider harm that may be consequent on participation, exclusion or dissemination of findings. Due consideration was given to all of these issues and a conclusion was drawn that it was unlikely, because of the approach taken to anonymise not only the data, but also the name of the organisation(s) and system being investigated, that no harm would be caused to any interviewee.

3.5 Selecting an opportunity for research.

Equipped with a research question and a research approach, a suitable opportunity to carry out meaningful research was actively sought. Towards the latter part of 2009 an opportunity was identified to carry out field research on a project where the researcher was working in the same organisation as the project team. The project was divided into a number of sub projects (eProcurement, eTrading, supplier adoption and project management) that all related to public sector electronic procurement systems. The project was funded by central government and had established project managers, teams and project support to run the project through an expected timescale of 2008 to 2013. With the equivalent of around 30 full time project staff and public sector secondee involvement, the project was regarded as a complex undertaking by central government sponsors. Selecting the project as the basis for this research appeared to have merit for a number of reasons. First, it conformed to the definition of the area of interest in that it was a large, complex, IS project with a number of sub projects within it that included software development. Second, research looking at the project was likely to be supported by senior managers in the organisation who considered academic research to be a positive activity that could potentially lead to some insights of benefit to the host organisation and possibly to improvements in future project performance. Third, the culture of the organization was such that there was a high level of confidence that project members would feel able to comment freely and honestly. Finally, and very importantly, the research could be undertaken whilst the project was live rather than following its completion, thus fulfilling one of the main aims of the research.

It was quickly decided to make use of this opportunity and design the research approach to suit it. Note that the project was not selected because it was in difficulty or that it was excelling in delivery – it was selected partly because there were no predefined opinions or expectations relating to its eventual outcome.

From a research methods standpoint, an important aspect that needed to be addressed was about the validity of results based on a single episode of field research. A potential

criticism of research conducted through a single study is that the findings are difficult to extrapolate in to wider context. The researcher is faced with the dilemma of producing research that provides insights into a particular instance (though with limited external validity) or trying to identify multiple occurrences and drawing more generally acceptable conclusions. Even though this research is not a 'case study', Kennedy's (1979) comments are relevant in that the lack of generally accepted rules for drawing causation and generalization inferences from the data as one drawback that may prevent it from being widely applied. Evers and Wu (2006) say that a single case study is, roughly speaking, an inquiry concerning a particular event, process, object, phenomenon or state of affairs. Evers and Wu also say that being able to generalise reasonably from a single case is a complex and difficult matter but suggest the task is abetted by three important factors. First, cases possess considerably more structure than is commonly supposed, being shaped by such external factors as culture, language, theory, practices of coordination and communication, and a network of constitutive and regulative rules. Secondly, researchers bring to a case much more knowledge than is often supposed, being bearers of some knowledge of these external factors, and therefore an idea of what observations might provide the most stringent tests for their presuppositions of inquiry. Thirdly, an ongoing trajectory of inquiry through time and changing circumstances makes it less likely that a stable match between patterns of researcher expectations and what is observed is sheer coincidence. Flyvberg (2006) though, says that by and large the case study is a necessary and sufficient method for certain important research tasks in the social sciences, and it is a method that holds up well when compared to other methods in the gamut of social science research methodology. More generally, Falk and Geunther (2006) point out that people do generalise from qualitative research; and more, they suggest that we may well have good reason to be able to do so. By 'good reason', they say that they mean that the generalised decisions that are made on the basis of the findings of qualitative research are sound, that the findings have indeed been generalised

successfully, i.e. when the findings have been applied more generally, it has been found that the generalising has proved valid and reliable.

As far as this research is concerned the decision to proceed with fieldwork and to take the opportunity to investigate this particular project was straightforward as the opportunity to have full access to a live project was fortuitously and uniquely available.

3.5.1 Further background

The project was funded and managed in the public sector. Its purpose was to design, develop and create an information system that would provide an integrated collection of tools and secure web-based services. The information system being developed and put in place by the project was intended to enable public sector organisations to source, order and pay for goods and services on-line, thereby making it faster, easier and less expensive for suppliers to trade with their public sector customers and would speed up payment to suppliers. When implemented, the IS would be required to support and enhance all aspects of a set of complex procurement processes and to enable radical changes to be made to the ways in which public sector organizations conduct their business with other bodies in the public, private and third sector. The system being developed had to be designed to meet the needs of individual public sector bodies and those who transact with them whilst at the same time delivering greater efficiency in terms of time and resources for all parties involved. In addition, the system would provide greater transparency and accountability for those inside and outside the public sector. Note that as such, the context is typical of many endeavours undertaken in the public sector in terms of both scale and an overarching agenda of delivering 'better value'. It was also the case, as is common in IS projects, and project management more generally, that the management had put considerable effort into communication, team building and project familiarisation activities, particularly during its early stages. These activities included workshops, presentations, team building events, 'away-days', formal training, project updates, newsletters and regular team updates.

The information system work undertaken was split into two principal strands: procurement; and purchasing. The procurement strand covered a suite of web-based tools designed to support the public sector organizations' tendering and contracting processes and their subsequent monitoring and management of supplier relationships to make them quicker, slicker and more efficient. The aim was to allow buyers and suppliers to conduct all their sourcing activities from tendering, to evaluation, to contract and vendor management in a secure on-line environment. In round figures, successful implementation would mean that two hundred separate public bodies could interact with a total of around 50,000 different suppliers to transact over €8bn of business per year. Purchasing was a smaller strand that would provide a set of tools (some sector specific such as education) to allow public sector buyers to select and order items from the catalogues of registered suppliers and pay for them.

3.6 From selection of methodology to research activity

Having found a project to study, the research entered into a stage of negotiation with the organisation and in particular the project manager regarding how the research would proceed. The opportunity was not selected from a range of candidate prospects; rather as described earlier, the opportunity for a significant piece of fieldwork became available. A document that described the general aims of the proposed research was prepared for the project manager and the contents were discussed in order to clarify any aspects that were not fully understood and to explore the best way of moving forward. Various options were considered, including undertaking a survey or gathering data by observation. The project manager indicated that he understood the aims of the research and appropriate permission was granted to proceed by looking in detail at how the research would be carried out. A detailed research plan was drawn up so that it could be reviewed by the project manager prior to engagement with any of the project staff. This plan set out the approach that would be taken, how the research would be carried out, who would be involved, how the data would be recorded and stored and how it would be analysed. The plan would be developed and relayed back to the project manager so that final authority to proceed with the research work could be given.

This research project was seen as compatible with and supportive of the research philosophy and was described to the project manager with a view to selecting it as the fundamental methodology for the research. Interviews with people in the project would form the basis of comparison with the project manager's responses and analysis.

3.6.1 Method of data collection

Since the focus of the research was to establish a view of how the participants in the project understood the project itself, a number of options for the collection of data were considered (see table 3.3). Qualitative data sources may include observation and

participant observation (fieldwork), interviews and questionnaires, documents and texts, and the researcher's impressions and reactions (Collis and Hussey 2003).

Type of data collection	Advantages	Disadvantages	Notes on applicability to this research
Questionnaires	Questionnaires are cheaper to administer, quicker to deploy (compared to structured interviews), Removal of any risk of interviewer bias, no interviewer variation and more convenient for respondents (as they can complete the questionnaire any time up to the closure date).	There is no opportunity to help the respondent should they find a question difficult to answer, risk of questionnaire fatigue (respondent abandons the questionnaire prior to completion), no control over the way that a respondent answers (the order may be different and they may ask for the opinion of others).	This approach was ruled out even though this remote technique may have had some advantages (e.g. the interviewer cannot introduce a bias) as it was felt that interviewees may not respond if they were relied upon to manage the process of completion and return completely 'under their own steam'.
Participant observation	Attempts to see through 'others' eyes', could uncover hidden behaviour that respondents might not be willing to discuss in interview, can define the context of the setting more effectively,	Some issues cannot be observed, difficult sometimes to capture what is being observed, some people would find it intrusive to be 'observed' and some might react differently with an observer present.	Participation observation was rejected, as it was difficult to see how this would not simply introduce a difficult situation for participants and potentially extend the time required to complete the research.
Documentation	Documentation is	Does not provide	Review of

review	readily available and may be analysed over a period of time, not dependent on memory of interviewees	any information from interviewees perspective, does not provide individual understanding to be assessed	documentation was rejected as it would not offer any inkling in regard to personal understanding of the project.
Interviews	Interviews make it easier to compare answers and may be carried out in person, by phone or screen-to-screen (e.g. video conference) and may be carried out on a one to one basis in person or by telephone. Questions can be asked in a standardised, controlled order, facilitating structured analysis of the responses, provides a personal response that would reflect that persons shared understanding, interviewee is not influenced by other interviewees,	Can generate a lot of data to analyse if the interview is not managed well, can suffer from 'interviewee bias', can suffer from interviewee variability where there is more than one interviewer.	This method was selected as it would provide a good basis to assess a person's shared understanding and the risk of bias and variability was removed as there would only be one single interviewer.
Focus Groups	Provides a view of how a group interacts and views the subject of research, is easy to arrange and carry out, encourages issues to come to the fore and provides an environment where ideas are challenged by other	Less easy to control, difficult to record an individual's viewpoint, can provide data that is more difficult to analyse, some members of the group may be less inclined to contribute.	This was rejected as this fieldwork was aiming to determine the shared understanding held by each individual.

	interviewees.		

Table 3.3 Types of data collection methods, (Source: columns 1,2,3 after Collis and Hussey, 2003, p. 132)

It was decided that based on the advantages and disadvantages of each option, the most appropriate method would be to carry out a series of interviews with a number of project members and analyse the data that was collected.

3.6.2 Selection of interview method

Having decided that interviews would be an appropriate method of collecting data, the criteria for selecting an interview method was considered. The approach adopted would need to cover the key matters of interest to the investigation but allow interviewees the opportunity to express their views in their own words as well as allowing the use of pre-coded and closed (yes/no) questions. There was obviously the need to be as consistent as possible in the interviews and this would have to be supported by the interview method. The interview structure was designed to create a range of measures of shared understanding, from basic questions through to more complex queries. The interviewee would also be asked to identify some aspects of the project from memory, but then be provided with a list of those items for subsequent relevant questions. It was considered desirable that the same interviewer would be conducting the interviews which would help to provide consistency but in addition, it was also regarded as important that the questions be asked in a fixed order and in the same way. Other interviewing factors were identified, such as providing enough time for the interviewees, to respond properly and giving them the opportunity to ask questions. A simple but important aim was to thank the participant for their contribution and time spent in the interview. In addition the approach should support the writing up of the responses as soon as possible after the interviews, so that they would be committed to record as accurately as possible.

The criteria for selecting the interview method were defined as:

1. It would be suitable for single-interviewee, face to face interviews
2. It would allow for the delivery of questions in a repeatable, consistent order (to avoid intra-interviewer variability)
3. It would support the use of closed questions that could be quantifiably analysed
4. It would allow the use of open questions that could be qualitatively analysed
5. It would allow note taking by the interviewer by hand/computer (i.e. without the use of voice recording apparatus)
6. It would provide enough time for the interviewees, so that they felt that they had received enough time to respond properly
7. It would facilitate the write up of the interview by the interviewer in a timely manner
8. It would give the respondents the opportunity to ask questions
9. It would support the development of an appropriate coding and scoring process
10. It would allow for an introduction at the start of the interview and for closing statements at the end of the interview (e.g. a simple thank you for their time)

A number of interview techniques for gathering data were considered, each having their own advantages and disadvantages. structured interview, semi-structured interview and unstructured interview were considered:

Structured interview: The structured (or standardised) interview aims to present the same questions in the same order to the interviewee. This means that each interviewee should receive the same interview experience and therefore responses can be compared or aggregated successfully. The structured interview is commonly employed in research. The aim of the structured interview is to interview respondents in a standardised way so that differences between interviews in any related research work are minimised. Foddy (1994) notes that changing the order in which response options are presented sometimes affects the respondents' answers. Bryman (2012) points out that structured interviews entail the administration of an interview schedule by an interviewer where the

aim is for all interviewees to be given exactly the same context of questioning and therefore exactly the same interview stimulus as each other. He goes on to explain that the goal of this style of interviewing is to insure the interviewees' replies can be aggregated and that this can be achieved reliably if those replies are in response to identical cues. The questions may still be selected from a range including closed, pre-coded or fixed choice. Care must be taken with this method or the outcome of the research could be compromised. Bryman (op cit) for example, lists common sources of error related to structured interviews:

- Poorly worded questions
- The way the question is asked by the interviewer
- Misunderstanding on the part of the interviewee
- Memory problems on the part of the interviewee
- The way the information is recorded by the interviewer
- The way the information is processed, either when answers are coded or when data are entered into the computer

Semi-structured interview: The term semi-structured typically refers to a situation where the interviewer has a series of questions that are in the general form of an interview schedule but is able to change the order of questioning if desired. The interviewer is also able to ask additional questions if appropriate. This approach was ruled out because it was thought that any variance in the order of questioning might introduce unintentional anomalous results. The ability to ask additional questions of some interviewees was also ruled out so that all responses could be analysed consistently as a group.

Unstructured interview: An unstructured interview is facilitated with a list of topics or questions that act as a general pointer for discussion. This approach was rejected

because of the possibility of confusing the context and the need to create a consistent level of comparison for analysis purposes.

Having reviewed the three interview methods the structured (or standardised) interview approach was selected because it met all of the criteria that had been specified. It was also thought that the potential problems listed by Bryman could be overcome with careful question design. Bryman (op cit) explains that researchers typically prefer the structured interview because it promotes consistency in the way that he or she asks questions and/or records answers. Although not relevant in this context, it also reduces the chances of any intra-interviewer error and inter-interviewer variability, whereby interviewers are not consistent with each other in the ways that they ask questions and/or record answers.

A decision was required as to whether the interviews should be recorded. The literature pointed to differing views on this subject. Silverman (Silverman, 2000) notes that when people's activities are tape-recorded and transcribed, the reliability of the interpretation of transcripts may be gravely weakened by a failure to record apparently trivial, but often crucial, pauses and overlaps. Bryman (op cit) says that recording provides a number of advantages such as making up for the natural limitations of our memories, allowing secondary analysis and allowing a more thorough examination of what people have said. He adds though that the procedure should be recognised as very time consuming and that recording may be off-putting for interviewees.

Walsham (2006) notes that recording interviews may be counterproductive. In comparing the advantages and disadvantages of recording interviews, he says that advantages include a truer record of what was said compared with the taking of notes during the interview, no matter how extensive. It is possible to return to the transcript later for alternative forms of analysis, and it is useful for picking out direct quotes when writing up while freeing up the researcher to concentrate on engaging with the interviewee. Against

this, Walsham explains that there are disadvantages in recording interviews including the fact that it is very time-consuming and/or expensive to do transcriptions and then to extract themes. Walsham makes a case that this time could be spent elsewhere for example, on more interviews or analysis and tape-recording does not capture the tacit, non-verbal elements of an interview, which are crucial aspects of the experience for the researcher. Finally, a crucial disadvantage for Walsham is that tape-recording may make the interviewee less open or less truthful. In light of the unfamiliarity of participants with recorded interviews and the need to maintain their confidence in anonymity, it was decided that the advantages of recording the interviews were in this case heavily outweighed by the disadvantages. It was therefor decided not to record the meetings, which would be held on a one to one basis, and responses would be noted down by the interviewer on paper by hand.

It was thought that a description of the research and why it was being carried out should be explained from a script at the start of each interview so that the context of the research was made explicit to the interviewee from the start. In addition, attempts would be made to establish a rapport with the interviewee and put them at ease so that they felt comfortable throughout. To help facilitate this, interviewees would be informed that:

- Participation was voluntary
- The respondent would not be identified or identifiable in any way
- The information provided would be kept confidential
- The answers could not be traced back to them
- That there was one single interviewer carrying out all of the interviews

The question order was set and asked in exactly the same order in every interview. By asking the questions in a fixed order, with the same single interviewer and asking them in the same way i.e. without any change in emphasis or change in order, it would then make it possible to illicit and record the responses as consistently as possible. The responses would then be written up as soon as possible after the interviews, so that they would be

committed to record as accurately as possible. The interview process would be run in exactly the same manner for each interview. It was agreed that the question set would be created and then an interview with the project manager would be carried out. The questions would then be modified if or where appropriate and then interviews would be carried out with a number of staff from the main groups in the project.

3.6.3 Identification of interviewees

Collis and Hussey (2003) describe these sampling methods for the identification of interviewees: Natural sampling is fairly common in business research and occurs when the researcher has little influence on the composition of the sample (e.g. only particular employees are involved in the phenomenon being investigated or only certain employees are available at the time of the study). Collis and Hussey note that it is important to try to avoid the situation where the employer selects the sample on criteria that are not divulged to the researcher, since it is possible that such a sample will be biased. In judgemental sampling, the participants are selected by the researcher on the strength of their experience of the phenomenon under study and the researcher makes the decision prior to the commencement of the interviews. Interviewees were identified using a mixture of natural and judgement based sampling. In this case it was seen as important that there was representation from across the whole project i.e. the research would be representative of all of the people in the project. The project manager had a key role in the creation of the fieldwork project and as the benchmark for the comparison of responses. The project manager's responses were important, as they would form the yardstick against which the level of shared understanding of each response would be measured. The project manager understood that the fieldwork was an academic study and that in addition, it could yield some benefit to the department on completion and review. The project manager reviewed the approach that was to be taken throughout the interviews and analysis of responses but it is important to note that the project manager

did not have any input to the methodology nor selection of interviewees. Staff availability was reviewed and it was decided that the duration for the completion of the interviews would be set at three months so that there was adequate time to fit interviewees in to a schedule, but also that the work was completed within a realistic time scale. The interviewees had all been team members from the start of the project in 2008 and had taken full part in activities such as workshops, presentations and team building events. The interviewees were considered by the project manager to represent a fair cross section of the project staff and provided interview data from all of the four sub projects (PMO. eSourcing, eProcurement and supplier enablement). At least three members of each sub-project were identified as 'definites' by discussion with the project manager, (natural sample) and then other interviewees selected from the other groups depending on availability and knowledge of the domain (judgement sample). In addition, to provide some sort of flexibility it was confirmed with the project manager that even though the remaining interviewees had been identified, if there was any difficulty in arranging interviews (for example of holidays or business issues prevented the meetings taking place) other candidates could be found.

3.6.4 Creation of questions

Bazeley (op cit) notes that there are no standard formulae for designing research interview questions and no agreement among authors about how focused or open they should be, the primary issues are that your research questions provide direction for, and set boundaries around your research plans. In this case therefore, the aim of the interviews was to collect information about how each interviewee viewed and understood the project. The questions were designed to capture the level of alignment and agreement between the responses so that an indication of the level of shared understanding could be assessed. The questions would explore how each interviewee was able to reflect the views of the PM and how each of those responses aligned to each other. In particular the questions were aimed at assessing how each interviewee

understood the aims and objectives of the project, the organisation of and around the project, the project management and the future end state of the project. Note that there would be no assessment of whether the response from an interviewee was correct or incorrect as there was no assessment of accuracy. The assessment was simply to determine if the interviewee provided a response, which was comparable to the project manager's response, i.e. displayed a level of shared understanding.

The broad range of topics the questions would cover:

What does the overall project do?

What are the aims of the project?

What workstreams are you aware of?

As well as more detailed matters such as:

Who are the main customers of the overall project?

Which work stream brings the best cashable benefits?

Which work stream brings the best process benefits?

The work of creating the questions was carried out taking into consideration the aims and objectives of the structured interview method. With these points in mind, the general approach to the interviews was considered and a schedule of questions was created that included open and closed questions that linked to the research aims. It would be appropriate to explore:

- the aims and objectives of the project, as defined by the project manager
- the aims and objectives, as understood by project team members
- any differences between these responses should they exist

Draft questions were piloted and tested with the project manager and revised questions were confirmed as suitable for use with the interviewees. Note that a reference list of all workstreams would be made available to the interviewee following completion of their response to question 3, and that list would then be available to them to refer to throughout the remainder of the interview.

The finalised question list for the first set of interviews was:

Question 1: What does the [system name] project do?

Question 2: What are the aims of the project?

Question 3: What workstreams are you aware of?

Question 4: What are the most important functions provided by the [system name] suite of tools?

Question 5: Who are the main customers of [system name]?

Question 6: How many organisations have signed up to each work stream?

Question 7: When will the [system name] project finish?

Question 8: Who is the sponsor of the [system name] project?

Question 9: If a customer had a requirement to send out a request for quotation, which system would you think most suitable?

Question 10: How many people work on the [system name] project?

Question 11: If a county council wanted to send out a pre-qualification questionnaire from [software component B], what would you say should come first?

Question 12: Where an OJEU notice is created, [system name] customers can create this in:

Question 13: [software component name] has been used to do one of the following:

Question 14: If you were adopting [system name] tools, what order would you adopt the tools?

Question 15: Which work stream would you say brings the best cashable benefits to the customer?

Question 16: Which work stream would you say brings the best process benefits to the customer?

Question 17: What would you change in the [system name] project?

Question 18: What do you think will happen at the end of the project?

Question 19: What will the project leave behind?

3.6.4.1 Categorisation of questions used

The questions put to the interviewees are categorised as one of the following four categories:

Questions about the project

Questions about the organisation

Questions about the project management

Questions about the future

Questions were also categorised as having a particular focus on either knowledge or understanding (although each question assesses levels of each attribute)

Questions about the project

Question 1: What does the [system name] project do? (Knowledge)

Question 4: What are the most important functions provided by the [system name] suite of tools? (Understanding)

Question 9: If a customer had a requirement to send out a request for quotation, which system would you think most suitable? (Understanding)

Question 11: If a county council wanted to send out a pre-qualification questionnaire from [software component B], what would you say should come first? (Understanding)

Question 12: Where an OJEU notice is created, [system name] customers can create this in: (Knowledge)

Question 13: [software component name] has been used to do one of the following: (Knowledge)

Question 15: Which work stream would you say brings the best cashable benefits to the customer? (Understanding)

Question 16: Which work stream would you say brings the best process benefits to the customer? (Understanding)

Questions about the organisation

Question 2: What are the aims of the project? (Knowledge)

Question 3: What workstreams are you aware of? (Knowledge)

Question 5: Who are the main customers of [system name]? (Knowledge)

Question 6: How many organisations have signed up to each work stream? (Knowledge)

Question 8: Who is the sponsor of the [system name] project? (Knowledge)

Questions about the project management

Question 7: When will the [system name] project finish? (Knowledge)

Question 10: How many people work on the [system name] project? (Knowledge)

Question 14: If you were adopting [system name] tools, what order would you adopt the tools? (Understanding)

Question 17: What would you change in the [system name] project? (Understanding)

Questions about the future.

Question 18: What do you think will happen at the end of the project? (Understanding)

Question 19: What will the project leave behind? (Understanding)

3.6.4.2 Arranging interviews

All interviewees were existing users the organisation's mail and calendar software so that was used to organise the interviews. Calendar invitations were sent out to interviewees at least four weeks prior to the meeting. The text in each invitation explained the background of the interview and a formal request to come along to the meeting. It was a relatively simple process to create and manage the meetings even where requests were made by the interviewees to change locations (each interviewee regularly visited one of three locations) or meeting times. Some meetings were rearranged (location or time) simply in order to take advantage of a prearranged work schedule so that the interview work was carried out as efficiently as possible.

3.6.5 Interviews

For the reasons outlined above, the first interview was with the project manager in his office. It was explained that the interview would be carried out in exactly the same way as for subsequent interviewees. The interview took approximately 45 minutes. Notes were taken by hand throughout this and other interviews. The specific outcomes of the interview are presented later, but this interview also sought the continued support of the project manager. The interview was duly completed and then the project manager was asked to comment on the interview, the questions and any other aspects of the meeting. The project manager indicated support for the interview pattern and the detail of the questions. The project manager also requested two additional open questions to be added at the end of the interview that asked for the interviewee's views on what they might change in the project and what they thought will happen at the end of the project.

The wording of the questions was agreed and they were added to the question schedule even though they were not strictly germane to the research. Following the review of the questions with the project manager and the addition of the two additional questions, no further changes were made to the questions schedule. The questions (nineteen including the two additional questions requested by the project manager) were finalised and stored.

The interviews with project members then took place over the period between February and April 2010. The amount of time for each interview varied, ranging from as little as fifteen minutes to one hour. Every effort was made to carry out the interview in a consistent, uniform manner, starting with an attempt to put the interviewee at ease. The interviewer attempted to establish a rapport with the interviewee as this is viewed as an advantage in an interview as it encourages the interviewee to feel comfortable in an interview situation Simons (2009). Interviewees were reminded that:

- Participation was voluntary
- That the respondent would not be identified or identifiable in any way
- The information provided will be kept confidential
- Answers could not be traced back to any individual
- That there was one single interviewer carrying out all of the interviews

Reiterating that the research would be anonymous and no answer or comment could be associated with any interviewee gave reassurance to the interviewees. Indeed, some commented that they might have approached the interview in a different way should the comments be directly attributable to them. As planned, interviewees were asked to identify elements of the project from memory in early questions and then provided with a reference list for the remainder of the meeting.

Notes were taken and these were transcribed as soon as possible after the interviews had finished. Each interviewee was thanked at the end of the interview. At the conclusion of

the interviews, the responses were collated in to a spreadsheet for analysis and graphical representation.

3.6.5.1 Interview pattern

Individual structured interviews were held with the project manager to elicit his intentions for the project and his perceptions. Further interviews were conducted with15 other key people working on the project's development to ascertain their understanding of the major features of the project. These 15 were drawn from the different parts of each project strand. Interviewees were selected so that managers, team leaders and team members were represented. Put simply, the interviews collected information about how each interviewee viewed and understood the project.

3.6.6 Capturing interview results

A spreadsheet (Microsoft Excel) was used to collate each of the responses from the project manager and the interviewees. The responses were keyed in to the appropriate fields in the spreadsheet and rechecked against the notes made during the interview. All files were saved in a file structure that reflected the date of the interview. The file locations were also backed up daily so that data could not be lost. During the analysis stage, for each response from an interviewee, a comparison would be made to the statement from the project manager and an assessment made as to how well the response illustrated shared understanding of that area of the project. At the end of the interviews, each set of responses to each question were reviewed to categorise the responses, wherever possible. The categorisation attempted to quantify how similar the responses were, and therefore how closely the understanding of the interviewee aligned to, or did not align to the understanding of the project manager. Note that there is no assessment of whether the response from an interviewee is correct or incorrect as there is no assessment of accuracy. The assessment is simply to determine if the interviewee

provides a response, which is comparable to the project manager's response, i.e. displaying a level of shared understanding. When this was completed for each of the questions, a brief narrative was added to the analysis in order to try to add some further interpretation of the responses made during interview.

3.6.7 Interviewee profiles

Each interviewee is described below and a summary of interviewee profiles is presented in Table 3.4.

N1: Senior PMO consultant (PMO sub group)

The senior PMO consultant was responsible for liaising with project leads and assisting in the standardisation of project outputs and standards, such as product descriptions, risk/assumptions/issue/decisions and dependencies. The senior PMO consultant had more than 4 years relevant procurement experience.

N2: Senior procurement lead (eSourcing sub group)

The senior procurement lead was responsible for defining the functionality of eSourcing system modules and acted as the subject matter expert for this area. The senior procurement lead had more than 10 years procurement experience.

N3: Senior client support lead (supplier enablement sub group)

The Senior Client support lead was responsible for defining the functionality of supplier enablement system modules and acted as the subject matter expert for this area. The Senior Client support lead had more than 20 years procurement experience.

N4: Junior procurement officer (PMO sub group)

The Junior procurement officer was responsible for assisting in the definition of the functionality of system modules by providing documentation, recording meeting outputs, distributing agreed requirements and maintaining project records.

N5: Project analyst (supplier enablement sub group)

The Project analyst was responsible for analysis of procurement data and the provision of assistance to suppliers in developing suitable data extract procedures.

N6: Senior consultant (eSourcing sub group)

The Senior consultant assisted in the definition of the functionality of eSourcing system modules.

N7: Managing consultant (eProcurement sub group)

The Managing Consultant was responsible for the provision of resources to the project as well as assisting in the definition of the functionality of eSourcing, eProcurement and payment system modules.

N8: Project analyst (PMO sub group)

The Project analyst was responsible for analysis of procurement data and the support of project groups dealing with data transfer and manipulation.

N9: Senior consultant (eProcurement sub group)

The Senior consultant was responsible for defining procedural aspects of system adoption and utilisation, including data management.

N10: Senior consultant (supplier enablement sub group)

The Senior consultantwas responsible for assisting suppliers in the activities required to transfer supplier product data in to the eSourcing system.

N11: eSourcing PM (eProcurement sub group)

The eSourcing PM was responsible for defining and implementing the functionality of eSourcing system modules and effectively acted as the subject matter expert for this area.

N12: Communications manager (PMO sub group)

The Communications manager was responsible for defining the communications output to all project team members and external communications to other parties.

N13: Senior project officer (eProcurement sub group)

The Senior project officer was responsible for defining the scope and range of functionality to be included in system functionality.

N14: Project officer (eSourcing sub group)

The Project officer was assisting the eSourcing group in the delivery of activity reports to the PMO.

N15: eProcurement data analyst (supplier enablement sub group)

The eProcurement data analyst was responsible analysing customer data and advising on the format and output required for subsequent load to the eProcurement system.

N16: Project Manager

The Project Manager was responsible for complete end to end project delivery, including all sub group projects. This included financial, resourcing, communications, system integration and roll out. The project manager acted as the conduit from and to the project sponsor.

Interviewee Reference ID	**N1**	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**	**N8**
Role Title	Senior PMO consultant	Senior procurement lead	Senior client support lead	Junior procurement officer	Project analyst	Senior consultant	Managing consultant	Project analyst
Project Group	PMO	eSourcing	Supplier enablement	PMO	Supplier enablement	eSourcing	eProcurement	PMO
Procurement Experience	> 4 years	> 10 years	> 20 years	> 2 years	> 5 years	> 10 years	> 25 years	> 8 years
Project experience	2 years	2 years	3 years	2 years	2 years	2 years	2 years	2 years
Interviewee Reference ID	**N9**	**N10**	**N11**	**N12**	**N13**	**N14**	**N15**	**N16 (PM)**
Role Title	Senior consultant	Senior consultant	eSourcing PM	Comms manager	Senior project officer	Project officer	eProcurement data analyst	Project Manager
Project Group	eProcurement	Supplier enablement	eProcurement	PMO	eProcurement	eSourcing	Supplier enablement	Project Manager
Procurement Experience	> 15 years	> 10 years	> 15 years	> 10 years	> 12 years	> 5 years	> 4 years	> 30 years
Project experience	2 years	2 years	2 years	2 years	3 years	2 years	2 years	3 years

Table 3.4 Interviewee profiles

3.6.7.1 Coding of interviewees

The nineteen questions posed to the fifteen interviewees in the first set of interviews have been analysed using these comparisons and the responses from the second set of interviews have been analysed in the same manner. In order to carry out the analysis with the anonymised data, codes have been allocated to each interviewee (see table 3.5). The structure of the interviewee code is:

1st three digits – individual identifier (e.g. N01)

Digit 4 = Group (M=PMO (project management office), S= eSourcing, E=Supp. Enablement, P=eProcurement)

Digit 5 = Seniority (S = senior role, J = junior role)

Digit 6 = Role (C = Consultant, A = Analyst, M = Management, O = Operational)

Note that Supp. Enablement is shown as Supp. Enablement in the text.

eTradingforSchools is referred to as eTfS.

Interviewee Number	Interviewee Code
N1	N01MJC
N2	N02SJO
N3	N03ESO
N4	N04MJO
N5	N05EJA
N6	N06SSC
N7	N07PSM
N8	N08MJA

N9	N09PSC
N10	N10ESC
N11	N11PSO
N12	N12MJM
N13	N13PSM
N14	N14SSM
N15	N15EJA

Table 3.5 Interviewee codes

3.6.8 Second stage interviews - departmental review and restructuring

The methodology set out above covers the research that was planned originally but approximately six weeks after the conclusion of the interviews, a review of project operations was instigated by directors and senior managers in the department. Following this review and some options appraisal work a decision was taken to restructure the organisation of the project and resize the reporting lines of individuals . This restructuring activity took place throughout August 2010. This provided an opportunity to carry out a further set of interviews with the same interviewees following the reorganisation when they would have had some time to reflect on the changes. In effect, they could now comment on how they saw the new structure and the new approach that had been described by senior managers. The first set of interviews had been held with sixteen interviewees (including the project manager interview). The second set was held during October 2010 with twelve interviewees (including the project manager) following exactly the same process as the initial set of interviews (Note: in the intervening period one interviewee passed away and three other staff had left the organisation).

3.6.9 Structure of the analysis

The analysis will look at the level of agreement between responses as a surrogate for evidence of shared understanding. First of all, for each question the responses will be summarised and tabulated so that comparison can be undertaken between the response of the PM and the rest of the interviewees (as a whole set). Then, setting aside the response of the PM the responses will be compared to look for patterns in the data that correspond to different levels of seniority, membership of a particular sub-project or the role of the interviewee. These comparisons (PM compared to all, intra-group comparison and inter-group comparison) are illustrated in Figure 8.

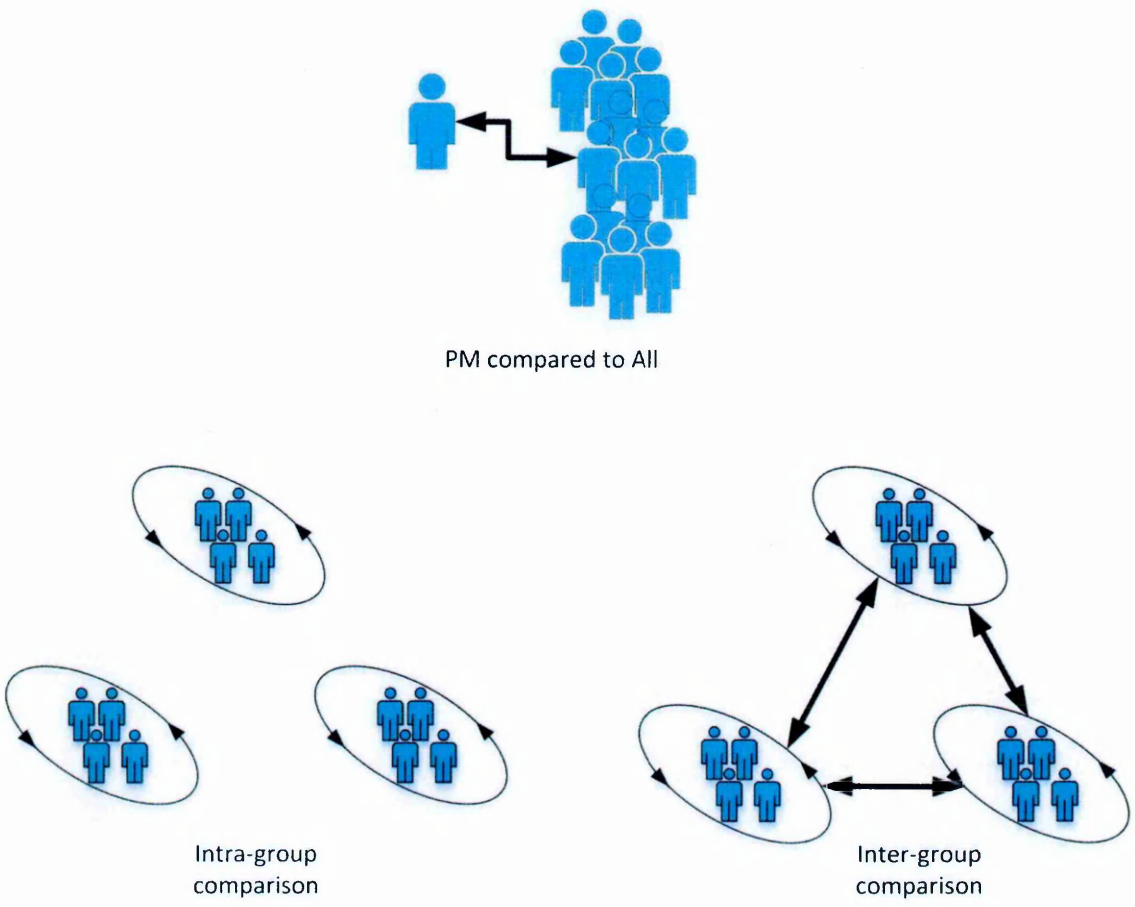


Figure 8: Basis for comparison of interviewee responses

3.7 Summary

Having identified a number of themes relating to project management and understanding project outcomes, and having observed that the literature review echoed these topics, a research question was developed that would form the basis for this research work:

> *During a large project, what level of coherence and consistency is apparent in key actors' perceptions of the current endeavours and envisaged end state?*

Because this research aims to understand the context of the IS project under study and look at how individuals shared understanding it is believed that an interpretive approach would be the best approach. This interpretivist philosophical view takes the position that the world is socially constructed and subjective and is suitable in this instance because of the need to focus on meanings of interviewee responses.

The methodology would focus on the views of interviewees while the project was 'in flight' rather than at a time following closure of the project. Fieldwork was selected as the methodology and in particular one to one interviews with project staff. Strong attention to the ethical aspects of the interaction with interviewees was paid so that the research work did not have a negative effect on participants. An opportunity arose where access to a project could be provided and interviews could be completed with project participants and having identified a suitable representative group of interviewees, those interviews were carried out and documented. An addition round of interviews became a possibility and this was completed some six months later, forming alongside the first set of interviews the body of interview responses that would be analysed for indications of shared understanding.

The following chapter compares the responses received from the PM and the rest of the interviewees, responses by role, group and seniority and looks for emerging themes from the findings.

Chapter 4 Findings and emerging themes

4.1 Introduction

This chapter contains the analysis of the interviewee responses and the findings derived during this investigation. The approach to the analysis and definition of findings is described in the methodology section. The analysis follows the same pattern for each question, starting with the tabular presentation of each response from the PM and each interviewee. To preserve anonymity each interviewee is represented each individual person by a unique code (see table 3.6, reproduced from methodology section for ease of reference, below).

Interviewee Number	Interviewee Code
N1	N01MJC
N2	N02SJO
N3	N03ESO
N4	N04MJO
N5	N05EJA
N6	N06SSC
N7	N07PSM
N8	N08MJA
N9	N09PSC
N10	N10ESC
N11	N11PSO
N12	N12MJM
N13	N13PSM
N14	N14SSM
N15	N15EJA

Table 3.6 Unique interviewee codes

The data is then classified and grouped so that it is more easily reviewed in the process of analysis, using a number of differing comparisons. Those comparisons are:

comparison of all the responses (as a whole set) with the response of the PM,

comparison of responses grouped by seniority, sub-project and role of the interviewee with the response of the PM,

comparison within responses grouped by seniority, sub-project and role of the interviewee (intra-group comparison)

and comparison between responses grouped by seniority, sub-project and role of the interviewee (Inter-group comparison).

The analysis for each question outlines where there is a level of alignment that is significant in this research. The last part of the chapter closes by summarising the findings and identifies the main themes that have emerged.

The questions put to the interviewees are categorised as follows:

Questions about the project (Questions 1, 4, 9, 11, 12, 13, 15 and 16)

Questions about the organisation (Questions 2,3,5,6, and 8)

Questions about the project management (Questions 7, 10, 14 and 17)

Questions about the future (Questions 18 and 19)

4.2 Analysis of initial responses (by question) – initial interviews (February 2010)

Part 1, Question 1: What does the [system name] project do?

The initial interviewee responses to this question are shown in Table 4.1. In Table 4.2 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'simple/vague overview'.

Interviewee	Response
PM	It's about automating the full end to end source to pay process by delivering that with a suite of electronic tools; starting with how do you source, goods or services and we use the procurement portal website for advertising contract opportun4ities and allowing suppliers to respond, through to tendering, contract management, evaluation tools through to having contracted a service how do you call off on that contract in terms of purchase orders, searching catalogues, sending the purchase order through to suppliers, and then paying via an electronic invoice on receipt of goods / services. Part of that includes the purchase mechanism called the purchasing card.
N01MJC	It makes [system name] tools available to appropriately enabled organisations
N02SJO	Made up of several modules - Sourcing, Trading for schools, epayment and suppliers. The journey starts on S2W and goes to Trading via a contract.
N03ESO	Group the processes logically and then get systems to cover the whole process from start to end.
N04MJO	Enable Trading and electronic means of paying for goods and services using catalogue systems and payment cards, allowing more efficient trading.
N05EJA	Getting the [Country] public sector to embrace technology from sourcing to payment to achieve efficiencies
N06SSC	Facilitates the delivery of eprocurement tools to the [Country] public sector.
N07PSM	Provides on-line shopping facility for the public sector
N08MJA	Trading - able to put tenders/contracts in to electronic form. Allow more efficient and effective purchasing
N09PSC	Project to try and get [Country] public sector and suppliers to act electronically for ordering, invoicing and payment
N10ESC	Provide access to electronic procurement tools and sourcing tools for the [Country] public sector
N11PSO	The project is split into specific workstreams to help the implementation of various functions and services and a stream to support adoption of suppliers.
N12MJM	It supports [Country] public sector bodies in the adoption and use of the [system name] tools.
N13PSM	Tries to 'sell' / offer tools to the public sector, and explain the advantages and the savings available
N14SSM	Trying to get people on to [system name] to make use of eprocurement tools so that they get a benefit - paperless purchasing from one catalogue
N15EJA	The project has a number of specific workstreams to help the implementation of eprocurement for the public sector

Table 4.1 Part 1, Question 1 (All responses)

Comprehensive	Broad overview with several specifics	Broad overview with some specifics	Simple/vague overview
2 responses: N02SJO N04MJO	7 responses: N05EJA N06SSC N08MJA N09PSC N10ESC N13PSM N14SSM	5 responses: N03ESO N07PSM N11PSO N12MJM N15EJA	1 response: N01MJC
Seniority Junior: 2 Senior: 0	Seniority Junior: 2 Senior: 5	Seniority Junior: 2 Senior: 3	Seniority Junior: 1 Senior: 0
Sub-project PMO: 1 eSourcing: 1 Supp. Enablement: 0 eProcurement: 0	Sub-project PMO: 1 eSourcing: 2 Supp. Enablement: 2 eProcurement 2	Sub-project PMO: 1 eSourcing: 0 Supp. Enablement: 2 eProcurement 2	Sub-project PMO: 1 eSourcing: 0 Supp. Enablement: 0 eProcurement 0
Role Consultant: 0 Analyst: 0 Management: 0 Operational: 2	Role Consultant: 3 Analyst: 2 Management: 2 Operational: 0	Role Consultant: 0 Analyst: 1 Management: 2 Operational: 2	Role Consultant: 1 Analyst: 0 Management: 0 Operational: 0

Table 4.2 Categorised responses to Question 1

Comparison of PM's responses with those of interviewees

The interviewees' responses ranged from a statement listing the software modules provided by the project through statements about parts of the project (e.g. Trading) through to a simple but accurate description of what the project actually does. None of the responses could be considered to be as full an answer as that provided by the PM. His picture was detailed but in addition, it attempted to describe the project as something that had a logical flow and was made up of discrete but interconnected parts.

Although eight responses all mention the public sector:

- N05EJA
- N06SSC

- N07PSM
- N09PSC
- N10ESC
- N12MJM
- N13PSM
- N15EJA

they do not illustrate a particularly coherent or insightful set of responses. The eight responses mention a range of other factors: embracing technology, facilitating delivery, providing on-line shopping, trying to get more use of the tools, providing access, supporting and explaining, selling/offering tools and implementation of tools. Although they represent a sizeable minority of the interviews with a common term in the responses, they do not share any common features; the senior / junior breakdown is approximately equal, they come from different sub-projects and roles (albeit three are in the Supp. Enablement sub-project and three are in the consultant role). Although the responses indicated that most of the interviewees displayed knowledge (to varying degrees) of the subject area, they also revealed a low level of alignment (i.e. understanding) in relation to the project manager's view on this topic. It is interesting to note that two junior staff provided the highest level of alignment (most comprehensive responses) with the PM. In comparing all of the responses (as a whole set) with the response of the PM there appears to be a low level of alignment. Comparing PM responses to interviewee responses grouped by seniority, sub-project or role, there does not appear to be a significant level of alignment.

Comparison of responses classified by seniority, sub-project and role

Seniority: Three of the seven junior interviewees mentioned efficiencies whereas no senior member of staff mentioned this aspect of the project. Three of the eight senior interviewees mention trying to get the public sector to use the system. Looking at the responses overall there is no particular common view illustrated by the responses in the junior or senior interviewee group and similarly, there is no particular agreement between

the responses made by junior interviewees compared with the responses made by senior interviewees.

Sub-project: Even though the three eSourcing responses are categorised either as 'comprehensive' (1 response) or 'Broad overview with several specifics' (2 responses), the responses are not particularly consistent with each other. The responses from the sub-projects do not illustrate a common agreement from the interviewees within each sub-project, nor do they illustrate a common agreement between them.

Role: The interviewees carrying out the consultant role tended to concentrate on the provision of the system to organisations. Operational staff tended to emphasise the process and structure of the system. Two of the three in analyst roles mentioned efficiencies. The management responses were not particularly similar. Looking at the responses overall there is no particular similarity between or within the responses in the Consultant, Analyst, Management or Operational interviewee groups. It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 1, Question 2: What are the aims of the project?

The responses to this question are shown in Table 4.3. In Table 4.4 the responses except those of the Project Manager have been placed into four categories ranging from 'comprehensive' to 'simple/vague overview'.

Interviewee	Response
PM	Support delivery of back office efficiencies in the public sector so that it can release benefits for front line services and ultimately benefit the citizens of [country].
N01MJC	Promote, market and roll out sourcing, eprocurement and epayment electronically for the public sector
N02SJO	[System name] is a shared service eprocurement system - for [country] public sector organisations
N03ESO	Aims to get the public sector to purchase online. To save money and safeguard the environment.
N04MJO	To enable [country] orgs to trade more efficiently and save public money
N05EJA	To achieve forecasted savings
N06SSC	To put fit for purpose tools in to organisations to ensure that they can buy goods and services at the lowest tco and promote collaboration
N07PSM	To get the public sector buying electronically, to improve efficiency
N08MJA	To be able to make savings so that front line services can be funded more effectively
N09PSC	Implement in timescale (sign up) from various sectors.
N10ESC	To bring procurement and sourcing in [country] up to 21st century and provide opportunity to achieve best value
N11PSO	To facilitate delivery of eprocurement compatibility to public sector organisations in [country] and to bring buyer and supplier communities together, and support delivery of efficiency gains and other benefits
N12MJM	To help the [country] public sector to deliver 70 - 200 million savings through the use of eprocurement.
N13PSM	To get the [country] public sector to use epurchasing
N14SSM	Not sure
N15EJA	To place a suitable set of eprocurement tools in front of the public sector and assist in the adoption of those tools

Table 4.3 Part 1, Question 2 (All responses)

Comprehensive	Broad overview with several specifics	Broad overview with some specifics	Simple/vague overview
0 responses	2 responses: N11PSO N12MJM	5 responses: N03ESO N04MJO N07PSM N08MJA N10ESC	8 responses: N01MJC N02SJO N05EJA N06SSC N09PSC N13PSM N14SSM N15EJA
Seniority Junior: 0 Senior: 0	Seniority Junior: 1 Senior: 1	Seniority Junior: 2 Senior: 3	Seniority Junior: 4 Senior: 4
Sub-project PMO: 0 eSourcing: 0 Supp. Enablement: 0 eProcurement 0	Sub-project PMO: 1 eSourcing: 0 Supp. Enablement: 0 eProcurement 1	Sub-project PMO: 2 eSourcing: 0 Supp. Enablement: 2 eProcurement 1	Sub-project PMO: 1 eSourcing: 3 Supp. Enablement: 2 eProcurement 2
Role Consultant: 0 Analyst: 0 Management: 0 Operational: 0	Role Consultant: 0 Analyst: 0 Management: 1 Operational: 1	Role Consultant: 1 Analyst: 1 Management: 1 Operational: 2	Role Consultant: 3 Analyst: 2 Management: 2 Operational: 1

Table 4.4 Categorised responses to Question 2

Comparison of PM's responses with those of interviewees

All but two responses had some sort of aim to report and those who could describe an aim illustrated a high level of knowledge of the project in general:

- N09PSC
- N14SSM

Only two responses might be considered to reflect the PM's understanding of the aims of the project:

- N11PSO

- N12MJM

Some responses correctly identified some aspects such as benefits or back office savings, but the respondents also mentioned a wider range of aims that in themselves would support the objectives described by the PM. In comparing all of the responses (as a whole set) with the response of the PM there appears to be a low level of alignment. Comparing PM responses to interviewee responses grouped by seniority, sub-project or role, there appears to be a low level of alignment.

Comparison of responses classified by seniority, sub-project and role

Leaving the response from the PM to one side, and looking at the responses of the interviewees, most of the responses were similar in that they mostly included the identification of the public sector in the use of the system or mentioned the aim of achieving savings. A small group

- N03ESO
- N04MJO
- N05EJA
- N08MJA
- N12MJM

tended to mention savings and in this group three were from the PMO and two from Supp. Enablement. It is of interest though that four junior interviewees mentioned public sector savings out of this group of five. Another group

- N01MJC
- N15EJA
- N09PSC
- N11PSO
- N13PSM
- N06SSC

tended to mention 'the use of eProcurement tools'. Note that the eProcurement sub group provided three of the responses, while those in a consultant role also provided three responses. Three of this group are in senior roles and two are in junior roles. Two of the four operational staff tended to emphasise savings, as did two of the three in analyst roles. The management responses were not particularly similar. The interviewees carrying out the consultant role did not provide similar responses.

Seniority: Although it is interesting that four junior interviewees mentioned public sector savings, three did not and therefore there is no particular agreement within, or between the junior or senior responses.

Sub-project: Although there was a small group that mentioned savings, comprising of three PMO and two supplier enablement interviewees, there is little to suggest any strong agreement within or between the sub-projects in the level of alignment.

Roles: There appears to be a slight correlation between operational and analyst interviewees to a small degree, because they mention savings.

It should be noted that, in general, apart from the small correlation between the operational and analyst roles, there are again no other substantial areas of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 1, Question 3: What workstreams are you aware of?

The responses to this question are shown in Table 4.5. In Table 4.6 the responses except those of the Project Manager have been placed into four categories. Table 4.7 shows the frequency and count of each interviewee that named one of the workstreams.

Interviewee	Response
PM	full range in source to pay: procurement portal (contract opportunities portal) through to full suite of sourcing tools (tendering , auctions, evaluation, contract management, on-line networking and training) to the marketplace trading hub able to load contract agreements (in the form of electronic catalogues) on the hub, then for suppliers to issue orders and receive invoices via the hub, then there is the payment card stream plus new developments that relate to new developments and products that may be on the horizon.
N01MJC	sourcing, trading, epayments (+schools)
N02SJO	procurement portal, sourcing, trading, [country] payment card, otis,
N03ESO	sourcing, trading, payment card, supplier adoption, procurement portal, otis
N04MJO	trading, payment card, pso, b4, s2
N05EJA	trading, sourcing, payment card, supplier adoption, procurement portal
N06SSC	procurement portal, sourcing, trading, [country] payment card, otis, award
N07PSM	supplier adoption
N08MJA	b4/s2/supplier adoption/payment card/sourcing/contracting
N09PSC	trading, sourcing, schools trading, auctions, trading
N10ESC	schools trading, trading, sourcing, etendering, payment card
N11PSO	procurement portal, sourcing, trading, [country] payment card, otis
N12MJM	trading, schools trading, sourcing, epayment, supplier adoption
N13PSM	payment card, trading, sourcing, supplier adoption
N14SSM	trading, sourcing, payment card, project management, schools trading
N15EJA	procurement portal, sourcing, trading, [country] payment card

Table 4.5:Part 1, Question 3 (All responses)

Number mentioning 7 or more (of 15 mentioned) streams	**Number identifying the 2 overarching streams and at least 4 of 13 other mentioned streams**	**Number identifying the 2 overarching streams and both *[Regional purchasing card]* and *contract opportunities portal***	**Number (of 15) identifying the two overarching streams**
0 responses	2 responses: N03ESO N06SSC	6 responses: N02SJO N03ESO N05EJA N06SSC N11PSO N15EJA	12 responses: N01MJC N02SJO N03ESO N05EJA N06SSC N09PSC N10ESC N11PSO N12MJM N13PSM N14SSM N15EJA
Seniority **Junior: 0** **Senior: 0**	Seniority Junior: 0 Senior: 2	Seniority Junior: 3 Senior: 3	Seniority Junior: 5 Senior: 7
Sub-project **PMO: 0** **Esourcing: 0** **Supp. Enablement: 0** **Eprocurement 0**	Sub-project PMO: 0 Esourcing: 1 Supp. Enablement: 1 Eprocurement 0	Sub-project PMO: 0 Esourcing: 2 Supp. Enablement: 2 Eprocurement 1	Sub-project PMO: 2 Esourcing: 3 Supp. Enablement: 4 Eprocurement 3
Role **Consultant: 0** **Analyst: 0** **Management: 0** **Operational: 0**	Role Consultant: 1 Analyst: 0 Management: 0 Operational: 1	Role Consultant: 1 Analyst: 1 Management: 0 Operational: 3	Role Consultant: 4 Analyst: 2 Management: 3 Operational: 3

Table 4.6 Categorised responses to Question 3

Respondent	eSourcing	eTrading	ePayments	eTfS	NPW	WPC	OTIS	Supplier Adoption	Project Support	B4Wales	S2Wales	Award	Contract Management	eAuctions	eTendering	Project Management
1	x	x	x	x												
2	x	x			x	x	x									
3	x	x			x	x	x	x								
4		x				x			x	x	x					
5	x	x			x	x		x								
6	x	x			x	x	x					x				
7								x								
8	x					x		x		x	x		x			
9	x	x		x										x		
10	x	x		x		x									x	
11	x	x			x	x	x									
12	x	x	x	x		x		x								
13	x	x				x		x								
14	x	x		x		x										x
15	x	x			x	x										

Table 4.7 Frequency and count of workstreams named by interviewees

Comparison of PM's responses with those of interviewees

Interviewees were asked to name the work streams from memory. It is noticeable that while no interviewee could replicate the list provided by the PM, a number did manage to list the main parts of the project along with a number of other streams. Even though the project had held a number of events to provide information to all project staff, it is notable that the majority of the interviewees could not name the work streams. No interviewee could name more than seven of the 15 workstreams. Of those who could identify 2 overarching streams, five were junior and seven were senior. There is no significant similarity between views of interviewees of either seniority (senior or junior) and the PM. The level of alignment with the PM illustrated by the majority of responses was low. Three streams were identified by the majority of interviewees, eSourcing (thirteen interviewees), eTrading (thirteen interviewees) and WPC (twelve interviewees). None of the other streams were identified by more than six interviewees. It may be useful to look at the

interviewees who could not identify the three most recognised streams. Compared as a whole the responses do not appear to have any more than no significant level of alignment with the PM. Comparing PM responses to interviewee responses grouped by seniority, sub-project or role, there does not appear to be a significant level of alignment.

Comparison of responses classified by seniority, sub-project and role

The two interviewees who could not identify eSourcing :

- N04MJO
- N07PSM

One is junior and the other senior, one is in the PMO and the other eProcurement, one is in an operational role and the other management. There is nothing in common between these two interviewees. The two interviewees who could not identify eTrading stream:

- N07PSM
- N08MJA

One is junior and the other senior, one is in eProcurement and the other in the PMO, one is an analyst and the other in management. Again, there is little in common between these two interviewees. The three interviewees who could not identify WPC:

- N01MJC
- N07PSM
- N09PSC

Two are in senior roles and one in a junior role. Two are in eProcurement roles and one is in the PMO. Two are in consultancy roles and one is in management. Although two consultants could not identify the WPC there is little commonality beyond this as they were in differing sub-projects and of different seniority. A number of workstreams could only be identified by one or two of the interviewees and these are distributed across a

range of roles and there is little to garner from this data although it is noticeable that only one interviewee identified project management and that person was in the supplier enablement sub-project (not one of the four in the PMO). Looking at streams that were identified by four to six interviewees (NPW, Supplier Adoption, eTfS and OTIS):

NPW was identified by six interviewees:

- N02SJO
- N03ESO
- N05EJA
- N06SSA
- N11PSO
- N15EJA

(three junior and three senior interviewees / three supplier enablement, two eSourcing and one eProcurement interviewee / three in analyst roles and three in operational). Although just six interviewees identified NPW, perhaps it is a little unexpected to see that no consultant or manager was able to name NPW.

Supplier adoption was identified by six interviewees:

- N03ESO
- N05EJA
- N07PSM
- N08MJA
- N12MJM
- N13PSM

(three junior and three senior interviewees / two supplier enablement, two eProcurement and two PMO / three managers, two analysts, one operational). It is notable that no eSourcing interviewees or consultants identified this workstream.

eTfS was identified by five interviewees

- N01MJC
- N09PSC
- N10ESC
- N12MJM
- N15EJA

three junior and two senior interviewees / two supplier enablement, one eProcurement and two PMO / three consultants, one analyst and one manager. No interviewee in the eSourcing subgroup or any interviewee in the operational roles identified this workstream. OTIS was identified by four interviewees:

- N02SJO
- N03ESO
- N06SSC
- N11PSO

one junior and three senior interviewees / two eSourcing, one supplier enablement, one eProcurement / one consultant, and three operational. It is notable that no manager or analyst identified this workstream.

Seniority: Seniority of the interviewees does not appear to be polarised to any extent, therefore there is no particular agreement within or between the junior or senior responses.

Sub-project: Although the eSourcing sub-project could not identify two of the workstreams where either 4, 5 or 6 interviewees had identified a workstream, there is little to suggest any strong agreement within or between the sub-projects in the level of knowledge or understanding.

Roles: eSourcing was not represented in the interviewees who identified two workstreams: Supplier Adoption and eTradingforSchools. This may be explained by the fact that eSourcing is not directly involved in the two areas. Overall, there does not appears to be any agreement within or between roles.

It is interesting to note, that in general, apart from the small correlation between the operational and analyst roles, there are again no other substantial areas of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 1, Question 4: What are the most important functions provided by the [system name] suite of tools?

The responses to this question are shown in Table 4.8. In Table 4.9 the responses except those of the Project Manager have been placed into four categories ranging from 'comprehensive' to 'simple/vague overview'.

Interviewee	Response
PM	a cohesive whole! they are all equally as important – the aim of the project was to join up the whole source to pay cycle – the most difficult to deliver are the trading elements which involves back office integration with various financial or erp systems at an organisational level. but I would argue that both advertising the contract opportunity, contracting via electronic means, sourcing and electronic auctions are equally important. it's the start point really as you have to have good quality contracts and content to be able to load them in to a central transaction hub so that end users can easily see, call off, order and pay for.
N01MJC	eOpportunities is probably the most important, but the trading hub is probably just as important.
N03ESO	supplier adoption - or there wouldn't be any products!
N04MJO	supplier adoption and trading
N05EJA **N14SSM**	Equally important they are all equally important they are all equally important
N06SSC	to render collaborative content collaboration in sourcing presentation of catalogue goods and services electronic ordering and invoicing [country] payment card
N02SJO **N07PSM** **N08MJA**	Trading probably the trading hub (order and invoice benefits) trading trading - to become more efficient (streamlining processes)
N09PSC	trading, einvoicing, payment card(these are equally important)
N10ESC	ability for a school to compare costs of same item from suppliers and einvoicing is going to give the main cash savings.
N11PSO	to support collaborative evaluation / to support buyer through the whole process / to simplify the procurement process / to provide access to the best value frameworks / to provide better access for suppliers/ help the public sector optimise processes and procurement spend,/ to give them the ability to manage budgets more effectively / to manage and control spend / to provide standard processes / to free up time for procurement admin staff
N12MJM	Etransactions between the buyer and the supplier
N13PSM	payment card sdol trading
N15EJA	probably equally procurement portal and trading

Table 4.8 Part 1, Question 4 (All responses)

comprehensive	broad overview with several specifics	broad overview with some specifics	simple/vague overview
2 responses: N05EJA N14SSM	6 responses: N01MJC N04MJO N06SSC N09PSC N11PSO N13PSM	5 responses: N02SJO N03ESO N07PSM N08MJA N15EJA	2 responses: N12MJM N10ESC
Seniority Junior: 1 Senior: 1	Seniority Junior: 2 Senior: 4	Seniority Junior: 3 Senior: 2	Seniority Junior: 1 Senior: 1
Sub-project PMO: 0 eSourcing: 1 Supp. Enablement: 1 eProcurement 0	Sub-project PMO: 2 eSourcing: 1 Supp. Enablement: 0 eProcurement 3	Sub-project PMO: 1 eSourcing: 1 Supp. Enablement: 2 eProcurement 1	Sub-project PMO: 1 eSourcing: 0 Supp. Enablement: 1 eProcurement 0
Role Consultant: 0 Analyst: 1 Management: 1 Operational: 0	Role Consultant: 3 Analyst: 0 Management: 1 Operational: 2	Role Consultant: 0 Analyst: 2 Management: 1 Operational: 2	Role Consultant: 1 Analyst: 0 Management: 1 Operational: 0

Table 4.9 Part 1, Categorised responses to Question 4

Comparison of PM's responses with those of interviewees

An interesting feature of many of the responses is that all but two are the opposite to the view held by the PM, that is the interviewees understand that a single system provides the most important functions, rather than a cohesive solution providing elements that are equally important. The interviewees that identified one or more systems were clear that there was an 'important' single system. This obviously does not align with the PM's understanding of the project. Two responses were the same as the PM, three said that eTrading was most important, although five others included trading in a list of more than one function.

The two interviewees who echoed the understanding of the PM were:

- N05EJA
- N14SSM

One is junior, the other senior. One is an analyst and the other is a manager. They are in different sub-projects, supplier enablement and eSourcing.

The three that cited trading as the most important were:

- N02SJO
- N07PSM
- N08MJA

Two were junior, one was senior. The sub groups are different, PMO, eProcurement and eSourcing. One was in the management group, one in analysis and the other in operations.

There five that included trading as one of the important features were:

- N01MJC
- N04MJO
- N09PSC
- N13PSM
- N15EJA

Three are junior, two are senior. Two are in the PMO, two in eProcurement and one in supplier enablement. Two carry out a consultancy role, one is operational, one is managerial and one is an analyst. Comparing PM responses to interviewee responses as a whole, there does not appear to be a significant level of alignment. Comparing PM responses to interviewee responses grouped by seniority, sub-project or role, there does not appear to be a significant level of alignment.

Comparison of responses classified by seniority, sub-project and role

Seniority: In comparing responses grouped by seniority of the interviewee and compared without reference to the PM, there does not appear to be a significant agreement within or between the differing levels of seniority.

Sub-project: There is no significant agreement within or between the sub-projects in knowledge or understanding.

Roles: There is no apparent agreement within or between different roles and the types of response to this question.

It should be noted that again, in general, there is no indication of a common view amongst interviewees that differs from the PM.

Part 1, Question 5: Who are the main customers of [system name]?

The responses to this question are shown in Table 4.10. In Table 4.11 the responses except those of the Project Manager have been placed into four categories depending on the organisations mentioned by the interviewee.

Interviewee	Response
PM	Technical and financial groups within any public organisation in [country]. But ultimate end user is someone who wants to order goods and services, and that could be a local school bursar or an admin clerk in a local authority who needs to order something to provide a service to a citizen.
N01MJC	[Country] public sector and (equally) suppliers
N07PSM	La's/schools/payment card/suppliers
N08MJA	Local gov, housing associations,nhs,schools, suppliers
N09PSC	All suppliers who wish to sell to the [country] public sector, or who would like to in the future. (and all public sector buyers)
N11PSO	All public sector organisations in [country], plus those suppliers who want to supply
N02SJO	Any public sector org!
N03ESO	Public sector - all of it and the 3rd sector.
N05EJA	[Country] public sector: local authorities, services and so on
N06SSC	[Country] public sector at large, key are nhs,[government], la's
N10ESC	[Country] public sector, cc's, nhs, schools, colleges
N12MJM	Local government, nhs and[government]are main customers
N13PSM	Public sector
N14SSM	Public sector organisations
N04MJO	Public sector buying organisations, suppliers and system suppliers
N15EJA	Public sector buying orgs, suppliers, system suppliers and government

Table 4.10 Part 1, Question 5 (All responses)

Comprehensive - public sector and service users	Mentioned public sector organisation	Mentioned some public sector organisations	Mentioned public sector organisations and suppliers	Mentioned supplier organisations
0 responses:	7 responses: N02SJO N03ESO N05EJA N06SSC N10ESC N13PSM N14SSM	1 responses: N12MJM	6 responses: N01MJC N04MJO N07PSM N08MJA N11PSO N15EJA	1 responses: N09PSC
Seniority Junior: 0 Senior: 0	Seniority Junior: 2 Senior: 5	Seniority Junior: 1 Senior: 0	Seniority Junior: 4 Senior: 2	Seniority Junior: 0 Senior: 1
Sub-project PMO: 0 eSourcing: 0 Supp. Enablement: 0 eProcurement 0	Sub-project PMO: 0 eSourcing: 3 Supp. Enablement: 3 eProcurement 1	Sub-project PMO: 1 eSourcing: 0 Supp. Enablement: 0 eProcurement 0	Sub-project PMO: 3 eSourcing: 0 Supp. Enablement: 1 eProcurement 2	Sub-project PMO: 0 eSourcing: 0 Supp. Enablement: 0 eProcurement 1
Role Consultant: 0 Analyst: 0 Management: 0 Operational: 0	Role Consultant: 2 Analyst: 1 Management: 2 Operational: 2	Role Consultant: 0 Analyst: 0 Management: 1 Operational: 0	Role Consultant: 1 Analyst: 2 Management: 1 Operational: 2	Role Consultant: 1 Analyst: 0 Management: 0 Operational: 0

Table 4.11 Part 1, Categorised responses to Question 5

Comparison of PM's responses with those of interviewees

Interviewees identified the public sector as the projects main customers but none of the interviewees mentioned an 'end-user' and some mentioned suppliers even though this was not included in the PM's response. This seemed to show that the PM had a view that included the 'end user' represented by a typical role such as the 'local school bursar'. The interviewees seemed to focus on the organisation rather than an individual view of a customer. The responses as a whole indicated no significant level of alignment with the

PM's view on this topic. Comparing PM responses to interviewee responses grouped by seniority, sub-project or role, there does not appear to be a significant level of alignment.

Comparison of responses classified by seniority, sub-project and role

Of the eight interviewees who mentioned the public sector:

- N02SJO
- N03ESO
- N05EJA
- N06SSC
- N10ESC
- N12MJM
- N13PSM
- N14SSM

three were in a junior role, five were in a senior role. Three were in supplier enablement, three were in eSourcing, one was in PMO and one in eProcurement. Two were in operational roles, three were in management, two were consultants and one was an analyst. This indicated within this group of eight, a level of agreement within and between the supplier enablement and eSourcing sub-groups.

Of the five interviewees who mentioned the public sector and suppliers:

- N01MJC
- N07PSM
- N08MJA
- N09PSC
- N11PSO

two were in a junior role, three were in a senior role. Two were in the PMO and three were in eProcurement. Two were in consultancy roles, and there was one each from analysis, management and operational. This indicated for this group of five, a level of agreement within the eProcurement sub-group. Although several interviewees mentioned the public sector, there was no mention of service users. There is little correlation between the interviewees responses to those of the PM.

Seniority: There does not appear to be a significant agreement within or between the differing levels of seniority.

Sub-project: There was a level of agreement within and between the supplier enablement and eSourcing sub-groups.

Roles: There was a level of agreement within the management role.

Part 1, Question 6: How many organisations have signed up to each work stream?

The responses to this question are shown in Table 4.12. In Table 4.13 the responses except those of the Project Manager have been placed into four categories ranging from 'comprehensive – 4 areas confirmed' to 'nil/not sure'.

Interviewee	Response
PM	Payment card 100+, majority if not all public sector use the procurement portal, 7 orgs trading on the hub to date (3 on stream shortly + whole of nhs), sourcing in excess of 800 users across whole of (every) sector across [country].
N01MJC	Procurement portal=300+ buyers, 3000+ users. More than 4600 suppliers. Trading? - no idea!
N02SJO	45000 on s2 (suppliers trading 6000 hub 8 orgs payment card 106
N03ESO	Sourcing 15 / trading 22 / payment card 50 / supp adopt lots! / b4 1000 / s2 30000
N04MJO	Not sure!
N05EJA	Trading - 13 payment card - 101 not sure about the others
N06SSC	Trading - 7 live / 3 in implementation payment card 100+ sourcing 75 b4 000's!
N07PSM	Supplier adoption
N08MJA	Payment card - 100, b4 - 150, s2 - 40,000, sa 1000, sourcing ?
N09PSC	Schools trading - 190
N10ESC	Schools trading - 4, trading 11, payment card 100+
N11PSO	6 trading, 4 for schools trading, 290 for sourcing, payment card 100+, s2 42000
N12MJM	Payment card 100+, trading = 18, schools trading = 4, sourcing = 30 , procurement portal = 150 buyers
N13PSM	Payment card 100+ not sure about others
N14SSM	Large [country] public sector bodies and suppliers
N15EJA	Trading - 7 + payment card 100 s2 45000 (b4 3000) sourcing 75

Table 4.12 Part 1, Question 6 (All responses)

Comprehensive – 4 areas confirmed	Three areas mentioned	Two areas mentioned	One area mentioned	Nil / not sure
1 response: N03ESO	4 response: N06SSC N11PSO N12MJM N15EJA	3 responses: N02SJO N05EJA N10ESC	5 responses: N01MJC N07PSM N08MJA N09PSC N13PSM	2 responses: N04MJO N14SSM
Seniority Junior: 0 Senior: 1	Seniority Junior: 2 Senior: 2	Seniority Junior: 2 Senior: 1	Seniority Junior: 2 Senior: 3	Seniority Junior: 1 Senior: 1
Sub-project PMO: 0 eSourcing: 0 Supp. Enablement: 1 eProcurement 0	Sub-project PMO: 1 eSourcing: 1 Supp. Enablement: 1 eProcurement 1	Sub-project PMO: 0 eSourcing: 1 Supp. Enablement: 2 eProcurement 0	Sub-project PMO: 2 eSourcing: 0 Supp. Enablement: 0 eProcurement 3	Sub-project PMO: 1 eSourcing: 1 Supp. Enablement: 0 eProcurement 0
Role Consultant: 0 Analyst: 0 Management: 0 Operational: 1	Role Consultant: 1 Analyst: 1 Management: 1 Operational: 1	Role Consultant: 1 Analyst: 1 Management: 0 Operational: 1	Role Consultant: 2 Analyst: 1 Management: 2 Operational: 0	Role Consultant: 0 Analyst: 0 Management: 1 Operational: 1

Table 4.13 Part 1, Categorised responses to Question 6

Comparison of PM's responses with those of interviewees

Nine responses were accurate in mentioning 100 users of the payment card but none of these were in the eProcurement sub-project. There was little in the way of consistency in the other responses to this question, however some interviewees were able to mention two or three of the main workstreams even if the numbers they quoted varied significantly. Some interviewees could not answer the question but those who did illustrated at least some knowledge of their area. The responses indicated no significant level of alignment with the PM's understanding of this topic.

In comparing all of the responses (as a whole set) with the response of the PM there appears to be a low level of alignment. Comparing PM responses to interviewee

responses grouped by seniority, sub-project or role, there does not appear to be a significant level of alignment.

Comparison of responses classified by seniority, sub-project and role

Comparing PM responses to interviewee responses grouped by seniority, sub-project or role, there does not appear to be a significant level of agreement.

Seniority: There was no particular agreement between the responses made by junior interviewees compared with the responses made by senior interviewees.

Sub-project: The responses from the sub-projects do not illustrate a common agreement within or between each sub-project, with the possible exception of the eProcurement group consistently failing to identify payment card usage figures.

Role: Looking at the responses overall there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It should be noted that, in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of difference amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 1, Question 7: When will the [system name] project finish?

The responses to this question are shown in Table 4.14. In Table 4.15 the responses except those of the Project Manager have been placed into three date categories.

Interviewee	Response
PM	Implementation March 2013, service management continues (ongoing).
N01MJC N02SJO N12MJM	Mar-2013
N03ESO N04MJO N05EJA N06SSC N07PSM N08MJA N10ESC N11PSO N14SSM N15EJA	2013
N09PSC N13PSM	2012

Table 4.14 Part 1, Question 7 (All responses)

Same year/month as pm	Same year – unsure of month	Different year
3 responses: N01MJC N02SJO N12MJM	10 responses: N03ESO N04MJO N05EJA N06SSC N07PSM N08MJA N10ESC N11PSO N14SSM N15EJA	2 responses: N09PSC N13PSM
Seniority Junior: 3 Senior: 0	Seniority Junior: 4 Senior: 6	Seniority Junior: 0 Senior: 2
Sub-project PMO: 2 eSourcing: 1 Supp. Enablement: 0 eProcurement 0	Sub-project PMO: 2 eSourcing: 2 Supp. Enablement: 4 eProcurement 2	Sub-project PMO: 0 eSourcing: 0 Supp. Enablement: 0 eProcurement 2
Role Consultant: 1 Analyst: 0 Management: 1 Operational: 1	Role Consultant: 2 Analyst: 3 Management: 2 Operational: 3	Role Consultant: 1 Analyst: 0 Management: 1 Operational: 0

Table 4.15 Part 1, Categorised responses to Question 7

Comparison of PM's responses with those of interviewees

Three of the interviewees were able to state the correct month and year but the majority were able to name the year only. It is interesting to note that three junior staff provided the highest level of alignment (the correct year and month end date) with the PM. Four out of the 10 responses that indicated the correct year were in junior positions. The two interviewees who had the wrong year were in senior positions, in the eProcurement sub-project and had roles as a consultant and manager. The responses indicated that there was some level of alignment and understanding of the PM's view on this topic. In spite of this, here was little difference overall between junior and senior interviewee responses.

Comparison of responses classified by seniority, sub-project and role

Looking at the responses overall there is a was some similarity within and between the responses grouped by seniority, sub-project or role.

Part 1, Question 8: Who is the sponsor of the [system name] project?

The responses to this question are shown in Table 4.16. In Table 4.17 the responses except those of the Project Manager have been placed into four categories ranging from 'named the same sponsor as PM' to 'did not know'.

Interviewee	Response
PM	Person A. Person B is the SRO.
N01MJC N06SSC N10ESC N11PSO N12MJM N15EJA	Person B
N02SJO	National Assembly
N03ESO N04MJO N05EJA N07PSM N08MJA N13PSM	[Government]
N09PSC N14SSM	Not sure

Table 4.16 Part 1, Question 8 (All responses)

Named the same sponsor as PM	Named a different person	Named a different organisation	Did not know
0 responses	6 responses: N01MJC N06SSC N10ESC N11PSO N12MJM N15EJA	7 responses: N03ESO N04MJO N05EJA N07PSM N08MJA N13PSM N02SJO	2 responses: N09PSC N14SSM
Seniority Junior: 0 Senior: 0	Seniority Junior: 3 Senior: 3	Seniority Junior: 4 Senior: 3	Seniority Junior: 0 Senior: 2
Sub-project PMO: 0 eSourcing: 0 Supp. Enablement: 0 eProcurement 0	Sub-project PMO: 2 eSourcing: 1 Supp. Enablement: 2 eProcurement 1	Sub-project PMO: 2 eSourcing: 1 Supp. Enablement: 2 eProcurement 2	Sub-project PMO: 0 eSourcing: 1 Supp. Enablement: 0 eProcurement 1
Role Consultant: 0 Analyst: 0 Management: 0 Operational: 0	Role Consultant: 3 Analyst: 1 Management: 1 Operational: 1	Role Consultant: 0 Analyst: 2 Management: 2 Operational: 3	Role Consultant: 1 Analyst: 0 Management: 1 Operational: 0

Table 4.17 Part 1, Categorised responses to Question 8

Comparison of PM's responses with those of interviewees

None of the interviewees could name the sponsor. Responses seemed to illustrate a disconnection between the interviewees and the PM. In comparing all of the responses (as a whole set) with the response of the PM there appears to be a very low level of alignment. Comparing PM responses to interviewee responses grouped by seniority, sub-project or role, there does not appear to be any level of alignment.

Comparison of responses classified by seniority, sub-project and role

Seniority: There was no particular agreement, within or between the responses made by junior interviewees compared with the responses made by senior interviewees.

Sub-project: The responses from the sub-projects do not illustrate a common agreement.

Role: Looking at the responses overall there is no particular agreement, within or between the responses made in the Consultant, Analyst, Management or Operational interviewee groups.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 1, Question 9: If a customer had a requirement to send out a request for quotation, which system would you think most suitable?

The responses to this question are shown in Table 4.18. In Table 4.19 the responses except those of the Project Manager have been placed into four categories ranging from 'comprehensive' to 'not sure'.

Interviewee	Response
PM	Need to be identified in the context of that customer! It could be simply use of NPW, small value quotation within their business rules and security is not an issue. If it is a high value critical item required and the user is already registered to use the [System component C] tools then they could use the Sourcing tools. If they happen to be a bursar sat in a school somewhere, the Trading for schools portal is available. If they're calling off an item from their sap or oracle system that is integrated with Trading, it might be sensible to do the rfq via the trading hub. That can then link back to the production of the purchase order and receipt of an invoice.
N01MJC **N10ESC**	PROCUREMENT PORTAL - because the easiest and most straight forward to create. Can also be used as an online exchange.
N02SJO	Can in all! - But PROCUREMENT PORTAL is probably best because of number of suppliers connected.
N03ESO	Sourcing [System component C]
N04MJO	If they had Trading, then use that.
N05EJA	This function is in Sourcing, Trading, - depends on context of client process
N06SSC	B4 - as most people have this! (and people know it). Trading RFQ may incur other costs. Can also do this in [System component C] and schools trading
N07PSM	Not sure - would need to review list
N08MJA **N09PSC** **N13PSM**	B4
N11PSO	[System component D]- or might be 4 [Country]. I'd tell them to look at the [system name] site.
N12MJM	Could be in Trading or schools trading but depends on other systems such as P2P
N14SSM	Depends on a number of factors; RFQ based on existing framework (been through Sourcing) then use [System component C], otherwise PROCUREMENT PORTAL (B4) or schools trading
N15EJA	Trading Then perhaps [System component C]?

Table 4.18 Part 1, Question 9 (All responses)

Comprehensive	Identified two potential systems	Identified one potential system	Not sure
3 responses: N05EJA N06SSC N14SSM	2 responses: N12MJM N15EJA	9 responses: N01MJC N02SJO N03ESO N04MJO N08MJA N09PSC N10ESC N11PSO N13PSM	1 responses: N07PSM
Seniority Junior: 1 Senior: 2	Seniority Junior: 2 Senior: 0	Seniority Junior: 4 Senior: 5	Seniority Junior: 0 Senior: 1
Sub-project PMO: 0 Esourcing: 2 Supp. Enablement: 1 Eprocurement 0	Sub-project PMO: 1 Esourcing: 0 Supp. Enablement: 1 Eprocurement 0	Sub-project PMO: 3 Esourcing: 1 Supp. Enablement: 2 Eprocurement 3	Sub-project PMO: 1 Esourcing: 0 Supp. Enablement: 0 Eprocurement 0
Role Consultant: 1 Analyst: 1 Management: 1 Operational: 0	Role Consultant: 0 Analyst: 1 Management: 1 Operational: 0	Role Consultant: 3 Analyst: 1 Management: 1 Operational: 4	Role Consultant: 0 Analyst: 0 Management: 1 Operational: 0

Table 4.19 Part 1, Categorised responses to Question 9

Comparison of PM's responses with those of interviewees

It is notable that the PM states that each case is different so the context will determine the approach. Most interviewees did not share that view and regularly opted to state that a single system is normally most effective functional area. It is interesting to note that the PM once again creates a vision of a user in his description (the school bursar) in a particular scenario. The interviewees seem to take a view that there is a straight forward system choice, not based on a context that takes in to account the individual organisation and users. Two are close to the view of the PM in that they describe a dependency of some kind that would lead to a decision being made that would suit the customer:

- N12MJM
- N14SSM

These two interviewees are in junior and senior positions, are in the PMO and eSourcing sub-projects but are both in management roles. Although this suggests a slight alignment to the management role, the responses suggest no low alignment as a whole, with the PM's view on this topic.

Comparison of responses classified by seniority, sub-project and role

Three interviewees selected B4 in isolation:

- N08MJA
- N09PSC
- N13PSM

This group has one junior and two senior / one PMO and two eProcurement / and one analyst, one consultant and one manager. There was a wide spread of responses.

Seniority: Looking at the responses overall there is no particular common agreement illustrated by the responses in the junior or senior interviewee group.

Sub-project: Excluding the slight correlation where two eProcurement interviewees identified B4, the responses from the sub-projects do not illustrate a common agreement from the interviewees within each sub-project, nor do they illustrate a common view between them.

Role: Looking at the responses overall there is no particular agreement in or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 1, Question 10: How many people work on the [system name] project?

The responses to this question are shown in Table 4.20. In Table 4.21 the responses except those of the Project Manager have been placed into four categories ranging from the 'same as the PM' to 'not sure'.

Interviewee	Response
PM	32 fte's in value [Country], a mix of contract, permanent, secondees, and short term temps.
N01MJC N02SJO N06SSC N08MJA N09PSC N10ESC N11PSO N12MJM N14SSM N15EJA	Within +/- 10 per cent
N03ESO	32
N04MJO N13PSM	Outside +/- 10 per cent
N05EJA N07PSM	Not sure

Table 4.20 Part 1, Question 10 (All responses)

Same as the pm	Within +/- 10 per cent	Outside +/- 10 per cent	Not sure
1 response: N03ESO	10 responses: N01MJC N02SJO N06SSC N08MJA N09PSC N10ESC N11PSO N12MJM N14SSM N15EJA	2 responses: N04MJO N13PSM	2 responses: N05EJA N07PSM
Seniority Junior: 0 Senior: 1	Seniority Junior: 5 Senior: 5	Seniority Junior: 1 Senior: 1	Seniority Junior: 1 Senior: 1
Sub-project PMO: 0 eSourcing: 0 Supp. Enablement: 1 eProcurement 0	Sub-project PMO: 3 eSourcing: 3 Supp. Enablement: 2 eProcurement 2	Sub-project PMO: 1 eSourcing: 0 Supp. Enablement: 0 eProcurement 1	Sub-project PMO: 1 eSourcing: 0 Supp. Enablement: 1 eProcurement 0
Role **Consultant: 0** **Analyst: 0** **Management: 0** **Operational: 1**	**Role** **Consultant: 4** **Analyst: 2** **Management: 2** **Operational: 2**	**Role** **Consultant: 0** **Analyst: 0** **Management: 1** **Operational: 1**	**Role** **Consultant: 0** **Analyst: 1** **Management: 1** **Operational: 0**

Table 4.21 Part 1, Categorised responses to Question 10

Comparison of PM's responses with those of interviewees

Although staff numbers were regularly reported in project updates only one interviewee response was exactly the same as the PM. Most other responses were roughly similar (within 10 per cent) but as the interviewees were based across three separate locations and therefore would not regularly see all of the staff together, the responses to this question would broadly be considered to be fairly good. Note that two interviewees, one consultant and one manager were not sure about the number of people working on the project. Of the four responses that were outside +/- 10%:

- N04MJO
- N05EJA
- N13PSM
- N07PSM

two were in the eProcurement sub-project and two were in the management role.

There is a high level of alignment within and between different seniority, sub-projects and role with the PM, illustrated by the high number (ten) of responses by sub-project within +/-10%.

Comparison of responses classified by seniority, sub-project and role

Seniority: There was a close level of agreement within and between Junior and senior groups as shown by the 10 responses within +/-10% - five junior and five senior.

Sub-project: There was a close level of agreement within and between the sub-projects.

Role: There was a close level of agreement within and between the management responses.

Part 1, Question 11: If a county council wanted to send out a pre-qualification questionnaire from [software component B], what would you say should come first?

The responses to this question are shown in Table 4.22. In Table 4.23 the responses except those of the Project Manager have been placed into three categories ranging from 'same view as the PM' to 'different view'.

Interviewee	Response
PM	Always start with the notice. Whether a PIN is issued will depend on the circumstances, but you should always issue a notice. I.e. that could be an OJEU notice or a notice below OJEU thresholds. An RFQ would be classed as a notice as well.
N01MJC **N06SSC**	A) or b). For ojeu, a pin then a notice would be raised. Sub ojeu, pqq can be attached to the notice. B) Non ojeu, no pin, could be notice but will always depend on what I'm doing and the type of procurement
N02SJO **N03ESO** **N10ESC** **N11PSO** **N12MJM** **N14SSM** **N15EJA**	A) Notice
N04MJO **N05EJA** **N07PSM** **N08MJA** **N09PSC** **N13PSM**	C B B B B B

Table 4.22 Part 1, Question 11 (All responses)

Same view as the pm	Broadly similar with additional options identified	Different view
7 responses: N02SJO N03ESO N10ESC N11PSO N14SSM N15EJA N12MJM	2 responses: N06SSC N01MJC	6 responses: N04MJO N05EJA N07PSM N08MJA N09PSC N13PSM
Seniority Junior: 3 Senior: 4	Seniority Junior: 1 Senior: 1	Seniority Junior: 3 Senior: 3
Sub-project PMO: 1 eSourcing: 2 Supp. Enablement: 3 eProcurement 1	Sub-project PMO: 1 eSourcing: 1 Supp. Enablement: 0 eProcurement 0	Sub-project PMO: 2 eSourcing: 0 Supp. Enablement: 1 eProcurement 3
Role Consultant: 1 Analyst: 1 Management: 2 Operational: 3	Role Consultant: 2 Analyst: 0 Management: 0 Operational: 0	Role Consultant: 1 Analyst: 2 Management: 2 Operational: 1

Table 4.23 Part 1, Categorised responses to Question 11

Comparison of PM's responses with those of interviewees

Multiple choice answers were offered to the interviewee: A = notice / B = PIN / C = Pre-release email / D = none of the above. Six of the responses did not reflect the PM's understanding:

- N04MJO
- N05EJA
- N07PSM
- N08MJA
- N09PSC
- N13PSM

This might be viewed as surprising as this was an important area in relation to the way that the system would operate. Seven of the responses indicated some understanding and alignment to the PM's view on this topic.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses overall there is no particular common view illustrated within or between the responses by junior or senior interviewees.

Sub-project: All three of the supplier enablement interviewees were in agreement:

- N15EJA
- N03ESO
- N10ESC

but there was no other particular alignment to sub-projects. This may be explained by the fact that these roles were closely involved with the pre-qualification processes linked to sourcing.

Role: Three of the four operational roles were in agreement:

- N02SJO
- N03ESO
- N11PSO

but overall there was no other particular alignment to roles.

In general, as well as no other common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 1, Question 12: Where an OJEU notice is created, [system name] customers can create this in:

The responses to this question are shown in Table 4.24. In Table 4.25 the responses except those of the Project Manager have been placed into three categories ranging from 'close alignment' to 'not sure'.

Interviewee	Response
PM	[system component c] has a notice generation tool that is only available to nhs users, so technically you can do this in the [system component c] tool. but our preference is for all notices to be created in the procurement portal. we are working on an integration solution where a notice can be created in [system component c] and it can be ported across to the procurement portal so that suppliers can be notified. this means that the notice alert functionality in the procurement portal will deliver the notice up to 3 days earlier in [country]. the matching facility cannot be found in any other sourcing solution – suppliers have to be invited.
N01MJC	A Portal
N02SJO	A
N08MJA	A
N11PSO	A
N13PSM	A
N15EJA	A
N03ESO	C
N05EJA	C
N06SSC	C
N07PSM	C
N10ESC	C
N12MJM	C
N04MJO	B
N14SSM	B
N09PSC	Not sure

Table 4.24 Part 1, Question 12 (All responses)

Close alignment	One system named	Not sure
6 responses: N01MJC N02SJO N08MJA N11PSO N13PSM N15EJA	8 responses: N03ESO N05EJA N06SSC N07PSM N10ESC N12MJM N04MJO N14SSM	1 responses: N09PSC
Seniority Junior: 4 Senior: 2	Seniority Junior: 3 Senior: 5	Seniority Junior: 0 Senior: 1
Sub-project PMO: 2 eSourcing: 1 Supp. Enablement: 1 eProcurement 2	Sub-project PMO: 2 eSourcing: 2 Supp. Enablement: 3 eProcurement 1	Sub-project PMO: 0 eSourcing: 0 Supp. Enablement: 0 eProcurement 1
Role Consultant: 1 Analyst: 2 Management: 1 Operational: 2	Role Consultant: 2 Analyst: 1 Management: 2 Operational: 2	Role Consultant: 1 Analyst: 0 Management: 0 Operational: 0

Table 4.25 Part 1, Categorised responses to Question 12

Comparison of PM's responses with those of interviewees

Multiple choice answers were offered to the interviewee: A = [software component B] / B = [software component name] / C = both the above / D = None of the above. Nine of the fifteen interviewees could not identify the systems identified by the PM. The responses suggest no level of alignment and understanding of the PM's view on this topic.

There is no significant alignment of the interviewee responses by seniority, sub-projects or role with the responses from the PM.

Comparison of responses classified by seniority, sub-project and role

Seniority: There was no particular agreement, within or between the responses made by junior interviewees compared with the responses made by senior interviewees.

Sub-project: There was no particular agreement, within or between the responses made by sub-projects.

Role: Looking at the responses overall there is no particular agreement, within or between the responses made by each role.

It is notable, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 1, Question 13: [software component name] has been used to do one of the following:

The responses to this question are shown in Table 4.26. In Table 4.27 the responses except those of the Project Manager have been placed into three categories ranging from 'same' to 'not sure'.

Interviewee	Response
PM	We've used the [System component] system to manage the process of assessing social care providers.
N01MJC **N02SJO** **N06SSC** **N12MJM**	A)
N03ESO **N04MJO** **N08MJA** **N09PSC** **N10ESC** **N14SSM** **N15EJA**	B
N05EJA **N07PSM** **N11PSO** **N13PSM**	C)

Table 4.26 Part 1, Question 13 (All responses)

Same	Different	Not sure
4 responses: **N01MJC** **N02SJO** **N06SSC** **N12MJM**	11 responses: **N03ESO N04MJO N08MJA** **N09PSC N10ESC N14SSM** **N15EJA** **N05EJA N07PSM N11PSO** **N13PSM**	0 responses:
Seniority Junior: 3 Senior: 1	Seniority Junior: 4 Senior: 7	Seniority Junior: 0 Senior: 0

Sub-project PMO: 2 eSourcing: 2 Supp. Enablement: 0 eProcurement 0	Sub-project PMO: 2 eSourcing: 1 Supp. Enablement: 4 eProcurement 4	Sub-project PMO: 0 eSourcing: 0 Supp. Enablement: 0 eProcurement 0
Role Consultant: 2 Analyst: 0 Management: 1 Operational: 1	Role Consultant: 2 Analyst: 3 Management: 3 Operational: 3	Role Consultant: 0 Analyst: 0 Management: 0 Operational: 0

Table 4.27 Part 1, Categorised responses to Question 13

Comparison of PM's responses with those of interviewees

This project was widely communicated and highlighted in project newsletters and other media. Multiple choice answers offered to the interviewee: A = Facilitate the assessment of social care providers / B = Provide access to nationally negotiated contracts / C = Send contract award notices to [System component D] suppliers.

The eleven responses that were very different to the PM's response seemed to reflect the interviewee's vague initial reaction to the question. The system had been used in a novel way and the PM and senior managers had sought to publicise this fact. This did not seem to register with these interviewees who offered quite different responses. The responses suggest no significant level of alignment to the PM's view on this topic.

There were four interviewees who indicated a close alignment to the PM;

- N01MJC
- N02SJO
- N06SSC
- N12MJM

three junior and one senior, two from the PMO and two from eSourcing and there were two in consultancy roles, one in operations and one in management. This is interesting as it shows that no one from eProcurement or supplier enablement was able to provide an answer that aligned with the PM.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses overall there is no particular common agreement illustrated by the responses by junior or senior interviewees.

Sub-project: Although four interviewees indicated a close alignment to the PM, (i.e. two out of the four in the PMO and two out of three in the eSourcing) there is no significant agreement in each of the sub-projects:

- N01MJC
- N02SJO
- N06SSC
- N12MJM

Role: There is no particular agreement between the responses by each role.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable areas of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 1, Question 14: If you were adopting [system name] tools, what order would you adopt the tools?

The responses to this question are shown in Table 4.28. In Table 4.29 the responses except those of the Project Manager have been placed into two categories, 'comprehensive' or 'did not mention context of organisation'.

Interviewee	Response
PM	In the order of an organisations capability – and strategic priorities. It is organisation dependant.
	(Payment card then B4)
N01MJC	PAYMENT CARD + B4 / 3 Trading and Supplier adoption / 5 [System component C]
N11PSO	PAYMENT CARD / B4 / Sourcing / Trading
	(payment card then sourcing)
N13PSM	PAYMENT CARD Sourcing Trading Supplier Adoption
N02SJO	1 PROCUREMENT PORTAL 2 [System component C] 3 Trading Hub 4 Supplier Adoption 5PAYMENT CARD
N04MJO	Procurement portal 1 PROCUREMENT PORTAL / 2 [System component C] / Trading / PAYMENT CARD
N15EJA	PROCUREMENT PORTAL / Trading
N07PSM	Nat Proc / PAYMENT CARD
N03ESO	1 Supplier adoption 2 Sourcing 3 PAYMENT CARD 4 Trading
	(Depends on context)
N05EJA	Would depend on the context of the business, their requirements and how they would like to make their efficiency savings - but PROCUREMENT PORTAL is likely to be #1
N10ESC	This would depend on the context of the organisation. E.g., Schools trading is easy for schools and would work well with Trading. Then etendering.
	(B4 then payment card)
N06SSC	B4 / PAYMENT CARD / Trading / [System component C]
N08MJA	Depends... / B4 / PAYMENT CARD / Trading
N12MJM	(B4 then trading)
N14SSM	B4 / Trading (or OTIS) / sourcing B4 [System component C] / Trading / PAYMENT CARD
N09PSC	Trading / PAYMENT CARD / Sourcing / etendering

Table 4.28 Part 1, Question 14 (All responses)

Comprehensive	Did not mention context of organisation
2 responses: N05EJA N10ESC	13 responses: N01MJC N02SJO N03ESO N04MJO N06SSC N07PSM N08MJA N09PSC N11PSO N12MJM N13PSM N14SSM N15EJA
Seniority Junior: 1 Senior: 1	Seniority Junior: 6 Senior: 7
Sub-project PMO: 0 eSourcing: 0 Supp. Enablement: 2 eProcurement 0	Sub-project PMO: 4 eSourcing: 3 Supp. Enablement: 2 eProcurement 4
Role Consultant: 1 Analyst: 1 Management: 0 Operational: 0	Role Consultant: 3 Analyst: 2 Management: 4 Operational: 3

Table 4.29 Part 1, Categorised responses to Question 14

Comparison of PM's responses with those of interviewees

Again, the majority of interviewees did not mention a key element described by the PM – the context of the organisation. It is clear that the interviewees mostly held the view that there was a prescribed order that would suit all organisations. Two of the fifteen mentioned the strategic approach of the organisation as being an important feature that would help determine the order of adoption:

- N05EJA
- N10ESC

They were both in supplier enablement, one junior and one senior and they were in analysis and consultancy roles.

Most of the interviewees seemed to have a fixed idea of component importance established in their view, which holds an importance that is not 'negotiable' even when describing their real world deployment in to large organisations. The responses suggest no significant level of alignment and understanding of the PM's view on this topic.

Of those who said that the payment card would be first:

- N01MJC
- N11PSO
- N13PSM

two were senior and one junior, two were in eProcurement and one on PMO, and there was one in consultancy, one in analysis and one in management.

Four said that the procurement portal would be first:

- N02SJO
- N04MJO
- N15EJA
- N07PSM

Comprising of two junior and two senior, one each from eSourcing, PMO, eProcurement and supplier enablement) and two operational, one analyst and one management.

A number singled out B4:

- N06SSC
- N08MJA
- N12MJM
- N14SSM

comprising of two junior and two senior, two eSourcing and two PMO, and two management, one analyst and one consultant. There is no significant alignment of the interviewee responses by seniority, sub-projects or role with the responses from the PM.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses overall there is no particular common agreement illustrated by the responses by junior or senior interviewees.

Sub-project: There is no strong agreement between the sub-projects in knowledge or understanding.

Roles: There is no apparent agreement between different roles and the types of response to this question.

It should be noted, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable areas of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 1, Question 15: Which work stream would you say brings the best cashable benefits to the customer?

The responses to this question are shown in Table 4.30. In Table 4.31 the responses except those of the Project Manager have been placed into three categories ranging from 'comprehensive' to 'none'.

Interviewee	Response
PM	The biggest return on investment to date is Auctions. Long term is the hub and trading network.
N01MJC	Trading
N14SSM	Trading
N03ESO	Trading / Sourcing / PAYMENT CARD
N04MJO	PAYMENT CARD / PROCUREMENT PORTAL
N10ESC	PAYMENT CARD and Trading (equally important), then Sourcing
N08MJA	PAYMENT CARD Otherwise Sourcing
N05EJA	For Trading it would depend on existing levels of efficiency (already have P2P?) - no idea for the others
N02SJO	Procurement : auctions, supplier: WPC
N06SSC	Auctions / PAYMENT CARD / Trading
N12MJM	Currently: Sourcing and Auctions, Future : Trading
N15EJA	Auctions, - once, then Trading
N07PSM	Probably Nat Proc but not sure
N09PSC	Etendering
N11PSO	Sourcing / PAYMENT CARD / Trading / schools trading
N13PSM	None would provide cashable savings

Table 4.30 Part 1, Question 15 (All responses)

Comprehensive	Other identified	None
4 responses: N15EJA N06SSC N02SJO N12MJM	10 responses: N01MJC N03ESO N04MJO N05EJA N07PSM N08MJA N09PSC N10ESC N11PSO N14SSM	1 responses: N13PSM
Seniority Junior: 3 Senior: 1	Seniority Junior: 4 Senior: 6	Seniority Junior: 0 Senior: 1
Sub-project PMO: 1 eSourcing: 2 Supp. Enablement: 1 eProcurement 0	Sub-project PMO: 3 eSourcing: 1 Supp. Enablement: 3 eProcurement 3	Sub-project PMO: 0 eSourcing: 0 Supp. Enablement: 0 eProcurement 1
Role Consultant: 1 Analyst: 1 Management: 1 Operational: 0	Role Consultant: 3 Analyst: 2 Management: 2 Operational: 3	Role Consultant: 0 Analyst: 0 Management: 1 Operational: 0

Table 4.31 Part 1, Categorised responses to Question 15

Comparison of PM's responses with those of interviewees

Four responses aligned closely to the PM response:

- N06SSC
- N02SJO
- N12MJM
- N15EJA

Ten of the respondents did not reflect the PMs views. The PM had discussed this issue and described how current auction activity and good results would eventually be surpassed by eTrading benefits. The responses suggest no significant level of alignment and understanding of the PM's view on this topic. The group of four that aligned closely

was made up of three junior and one senior, two sourcing, one supplier enablement and one PMO and each of the four roles was represented once. It is interesting to note that three junior staff provided the highest level of alignment (most comprehensive responses) with the PM, but overall neither junior nor senior responsibility groups appear to have a close level of alignment with the PM.

Comparison of responses classified by seniority, sub-project and role

Seniority: In comparing responses grouped by seniority of the interviewee and compared without reference to the PM, there does not appear to be a significant agreement between the differing levels of seniority.

Sub-project: There is no strong agreement between the sub-projects in knowledge or understanding.

Roles: There is no apparent agreement between different roles and the types of response to this question.

It is interesting to note, that again, in general, there is no indication of a common view amongst interviewees that differs from the PM.

Part 1, Question 16: Which work stream would you say brings the best process benefits to the customer?

The responses to this question are shown in Table 4.32. In Table 4.33 the responses except those of the Project Manager have been placed into three categories ranging from 'comprehensive' to 'main system not identified'.

Interviewee	Response
PM	Closely followed by simplest to implement and simplest to use but is process savings is the PAYMENT CARD. Again, long term is the hub and trading network.
N01MJC	PROCUREMENT PORTAL - as specced for release in Dec 2010
N02SJO	Procurement: Trading hub (if full P2P) (if not [Country] Payment Card)
N04MJO	Trading / PROCUREMENT PORTAL
N05EJA	Trading / Sourcing / PAYMENT CARD
N06SSC	Trading (P2P then Hub)
N07PSM	Trading
N09PSC	Trading
N10ESC	Trading / PAYMENT CARD
N15EJA	Trading
N03ESO	1 Sourcing / 2 PAYMENT CARD / 3 Trading
N11PSO	Sourcing / Trading / Schools trading / PAYMENT CARD
N08MJA	B4 / PAYMENT CARD / schools trading
N12MJM	Currently: PAYMENT CARD Future: Trading
N14SSM	PAYMENT CARD
N13PSM	All of them provide some level of process benefits - as they are all electronic rather than paper based - all equal

Table 4.32 Part 1, Question 16 (All responses)

Comprehensive	Main system identified with others	Main system not identified
1 response: N12MJM N14SSM	7 responses: N02SJO N11PSO N10ESC N08MJA N05EJA N03ESO	7 responses: N01MJC N04MJO N06SSC N07PSM N09PSC N13PSM N15EJA
Seniority Junior: 1 Senior: 1	Seniority Junior: 3 Senior: 3	Seniority Junior: 3 Senior: 3
Sub-project PMO: 1 eSourcing: 1 Supp. Enablement: 0 eProcurement 0	Sub-project PMO: 1 eSourcing: 1 Supp. Enablement: 3 eProcurement 1	Sub-project PMO: 2 eSourcing: 1 Supp. Enablement: 1 eProcurement 3
Role Consultant: 0 Analyst: 0 Management: 2 Operational: 0	Role Consultant: 1 Analyst: 2 Management: 0 Operational: 3	Role Consultant: 3 Analyst: 1 Management: 2 Operational: 1

Table 4.33 Part 1, Categorised responses to Question 16

Comparison of PM's responses with those of interviewees

Two of the interviewees identified PAYMENT CARD as bringing the best process benefits and aligned well with the PM:

- N12MJM
- N14SSM

Others did mention PAYMENT CARD along with other systems in contrast to the PM who identified PAYMENT CARD in isolation:

- N11PSO
- N10ESC
- N03ESO
- N02SJO
- N08MJA

- N05EJA

The interviewees seemed to be saying that there were a number of runners in a group rather than an out and out leading work stream. This was certainly not the view of the PM. The responses suggest no significant level of alignment and understanding of the PM's view on this topic. The two interviewees who aligned well with the PM were in junior and senior positions, were in the PMO and eSourcing and were both in management roles.

Comparison of responses classified by seniority, sub-project and role

Several interviewees included PAYMENT CARD in their response:

- N11PSO
- N10ESC
- N03ESO
- N02SJO
- N08MJA
- N05EJA

Seniority was not a factor as there were three junior and three senior people in this group. Three supplier enablement, one PMO, one eSourcing and one eSourcing sub-project members were in this group. Three were in operations, two were analysts and one was a manager.

Seniority: There does not appear to be a significant agreement between the differing levels of seniority.

Sub-project: The three supplier enablement sub-project members shows a good agreement by including the payment card in their response, but it should be noted that this item was mentioned in addition to other workstreams (i.e. limited agreement).

Roles: There is no apparent agreement between different roles and the types of response to this question.

It is interesting to note, that in general, there is no indication of a common agreement amongst interviewees that differs from the PM.

Part 1, Question 17: What would you change in the [system name] project?

The responses to this question are shown in Table 4.34. In Table 4.35 the responses except those of the Project Manager have been placed into four categories ranging from 'Comprehensive – mentioned organisational structure, strategy and marketing / awareness' to 'unrelated/vague response'.

Interviewee	Response
PM	Change is key – we need to continuously change to reflect the needs of the customer. Lessons learned and the enhancement of technologies. So change at the moment is related to organisation structure. Would have linked to have had more control over the service provider contracts. Now is the time to do a sourcing strategy for procurement in Wales, to see what is the best fit going forward. At the start of the project, these tools were the best available. Trading cannot stand alone – it has to have all of the other features – it would be nice to make more people aware of the whole picture.
N01MJC	Change focus to results and create closer lines of responsibility
N02SJO	Marketing - too functionally oriented. Should be marketed as an individual project - suppliers too!
N03ESO	Supplier adoption are reluctant to telephone suppliers - so better selection of staff and training required. Need a more consistent approach to dealing with suppliers.
N04MJO	Supplier adoption needs to change - process improvement, consistency of process
N05EJA	More joined up approach for supplier adoption and Trading
N06SSC	Greater cooperation, more honesty about what they are doing and trust to get on with it the right way , plus an agreed strategy
N07PSM	Spreadsheets are not databases! Info should be in a database New starters need more info, data associated with clients should be managed better
N08MJA	Encourage more team working, Remove Silo working, Create a better awareness of other streams, Make public more aware of the project
N09PSC	Internal team communication is weak - not enough sharing of info between workstreams
N10ESC	Better communication between workstreams as it tends to be one way Awareness of other software
N11PSO	Supplier management process - we need fully deployed catalogues to encourage engagement and need to provide more service support after go-live. Also provide ongoing communication support to support cultural change as well as technical.
N12MJM	Change Trading / Supplier adoption so that supplier adoption forms part of Trading
N13PSM	Poor communication / awareness between the workstreams. / Monthly updates - awareness training / Not a clue what happens in the other workstreams
N14SSM	Lack of continuity when passing info on / Silo mentality / Need more tools to get data from Sourcing in to Trading
N15EJA	Take more care assessing , Customer requirements

Table 4.34 Part 1, Question 17 (All responses)

Comprehensive	Broad overview with several specifics	Broad overview with some specifics	Simple/vague overview
2 responses: N02SJO N04MJO	7 responses: N05EJA N06SSC N08MJA N09PSC N10ESC N13PSM N14SSM	5 responses: N03ESO N07PSM N11PSO N12MJM N15EJA	1 response: N01MJC
Seniority Junior: 2 Senior: 0	Seniority Junior: 2 Senior: 5	Seniority Junior: 2 Senior: 3	Seniority Junior: 1 Senior: 0
Sub-project PMO: 1 eSourcing: 1 Supp. Enablement: 0 eProcurement: 0	Sub-project PMO: 1 eSourcing: 2 Supp. Enablement: 2 eProcurement 2	Sub-project PMO: 1 eSourcing: 0 Supp. Enablement: 2 eProcurement 2	Sub-project PMO: 1 eSourcing: 0 Supp. Enablement: 0 eProcurement 0
Role Consultant: 0 Analyst: 0 Management: 0 Operational: 2	Role Consultant: 3 Analyst: 2 Management: 2 Operational: 0	Role Consultant: 0 Analyst: 1 Management: 2 Operational: 2	Role Consultant: 1 Analyst: 0 Management: 0 Operational: 0

Table 4.35 Part 1, Categorised responses to Question 17

Comparison of PM's responses with those of interviewees

The PM mentions organisational structure, strategy and marketing / awareness. It is interesting to note that there is a wide range of responses from the interviewees. Two responses mention some aspects that align well with the view of the PM:

- N08MJA
- N10ESC

The other responses are varied – they include potential improvements to project/project management, changes to structure, improvements to internal project communications and improved inter project working. The responses are sensible and logical from a group that

have significant expertise and experience in the field. Their statements are varied but valid as 'stand-alone' comments. Some themes emerge; four interviewees mentioned communications related activity:

- N02SJO
- N09PSC
- N10ESC
- N13PSM

four mentioned Supplier Adoption activity:

- N03ESO
- N04MJO
- N11PSO
- N12MJM

and three mentioned needing to be 'joined up':

- N05EJA
- N06SSC
- N08MJA

Comparing PM responses to interviewee responses grouped by seniority, sub-project or role, there does not appear to be a significant level of alignment with the PM.

Comparison of responses classified by seniority, sub-project and role

Seniority: Three of the four interviewees that mentioned communications were in senior positions, but there was no overall agreement between the responses made by junior or senior interviewees.

Sub-project: The responses from the sub-projects do not illustrate a common agreement from the interviewees within each sub-project, nor do they illustrate a common view between them.

Role: The three interviewees that mentioned supplier adoption were in operations, but apart from this, overall there was no particular agreement within or between roles.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 1, Question 18: What do you think will happen at the end of the project?

The responses to this question are shown in Table 4.36. In Table 4.37 the responses except those of the Project Manager have been placed into two categories 'BAU / Will continue' or 'simple/vague overview '.

Interviewee	Response
PM	Not applicable
N01MJC	Service management is maintained - Operational delivery will reduce and it is then business as usual
N02SJO	March 2013 - not all will be on board... need to plan next stages now, based on a business benefit and business plan for each org.
N03ESO	Probably small numbers using the tools, who are confident and make a lot of use of the tools. Others will probably drop the tools because they don't get much experience with the sourcing tools. Schools should be much better and use the tools as they provide an advantage.
N04MJO	Go in to service mode (at least for some strands)
N05EJA	After closure - ongoing service managed by [GOVERNMENT] and second level support by the OEM
N06SSC	Will it end when forecast? Might go on! Only if there is a business case to extend the project. Service delivery- e.g. Single contact for suppliers
N07PSM	Maintenance of process (service) Small team in place to manage BAU SBO's can manage costs themselves
N08MJA	We'll have built a foundation that will continue. Currently there is a problem where buying organisations give up following the set up stage. The Sourcing software is difficult for users. Business benefits should be enough so that it continues. Savings will be even more important over the next few years.
N09PSC	Hope that benefits are clear and cash benefits are visible
N10ESC	Hopefully the public sector will continue to use the tools and take ownership of the products.
N11PSO	Like to think that there will be a business as usual function that will further develop capability - but in reality the project will be extended or become part of the [GOVERNMENT] Procurement function - where it will probably get lost
N12MJM	Establish an ongoing support team to provide BAU functions and support to customers, Leave behind a work process that uses the full range of procurement tools as standard - and forms the normal mode of operation. In addition a consensus that eprocurement delivers benefits.
N13PSM	Will it end? Might be extended and set new targets - if it is successful it will continue
N14SSM	Won't stop! Ongoing service delivery - organisations will need support and guidance.
N15EJA	Possibly extend project for another year or so

Table 4.36 Part 1, Question 18 (All responses)

BAU / will continue	Simple/vague overview
13 responses: N01MJC N03ESO N04MJO N05EJA N06SSC N07PSM N08MJA N10ESC N11PSO N12MJM N13PSM N14SSM N15EJA	2 responses: N02SJO N09PSC
Seniority Junior: 6 Senior: 7	Seniority Junior: 1 Senior: 1
Sub-project PMO: 4 Esourcing: 2 Supp. Enablement: 4 Eprocurement 3	Sub-project PMO: 0 Esourcing: 1 Supp. Enablement: 0 Eprocurement 1
Role Consultant: 3 Analyst: 3 Management: 4 Operational: 3	Role Consultant: 1 Analyst: 0 Management: 0 Operational: 1

Table 4.37 Part 1, Categorised responses to Question 18

Comparison of responses classified by seniority, sub-project and role

Although there is no PM response to compare with, it is useful to note the range of responses from the interviewees. Most responses included a reference to some sort of business as usual function, or suggested that there might be a continuation of the project beyond the planned end. In comparing responses grouped by seniority of the interviewee and compared without reference to the PM, there does not appear to be a significant agreement in line with the differing levels of seniority. In comparing responses grouped by sub-project of the interviewee and compared without reference to the PM, there does not appear to be a significant level of agreement. In comparing responses grouped by role of the interviewee and compared without reference to the PM, there does not appear to be a significant level of agreement.

Part 1, Question 19: What will the project leave behind?

The responses to this question are shown in Table 4.38. In Table 4.39 the responses except those of the Project Manager have been placed into four categories ranging from 'Better eProcurement' to 'other'.

Interviewee	Response
PM	Not applicable
N01MJC	An E-enabled [Country] public sector with a supplier base that is supportive
N02SJO	Central support function left behind, providing continuing support and service. Better catalogue and framework agreements. An element of growth in the economy, as it will be easier to buy.
N03ESO	It will leave behind a good example as the carbon footprint will be smaller and many other countries will want to follow suit. It will leave behind a good reputation for the project leaders.
N04MJO	Enough change so that people in external organisations will be able to make use of systems efficiently and effectively. Achieving benefits! Achieving what we set out to do.
N05EJA	Public sector to adopt tools that make procurement more efficient and an 'exemplar' for the use of the tools
N06SSC	Leave a legacy (on the whole) of improved performance and efficiency with lowered costs and greater opportunity to provide front line services, but this is at threat if we put the wrong tools in organisations. And we'll leave some subject matter experts behind.
N07PSM	Lot less paper used! / Better comms and networking
N08MJA	Buying communities will have moved on and 'bought in' to the concept of eprocurement and help the support of small businesses. It will also provide a real benefit for small SME's in particular
N09PSC	A more efficient way of working for procurement teams and their customers
N10ESC	A better equipped public sector.
N11PSO	We have the potential to leave a high number of public sector organisations with the tools , but we may also leave behind a number of tools that may become outdated, or redundant unless developed further
N12MJM	Establish a support team to provide BAU functions and support to customers
N13PSM	A better way of purchasing - faster, more efficient, more for less
N14SSM	Legacy continues - a good reputation, e.g.' schools will have better deals when purchasing schools equipment. It won't be lost - lasting benefits and evidence of savings will provide valuable lessons.
N15EJA	This will leave behind a better economy for [Country] with better buying and less administrative bureaucracy

Table 4.38 Part 1, Question 19 (All responses)

'Better' eprocurement	Legacy / reputation	Benefits / efficiency	Other
5 responses N02SJO N07PSM N10ESC N13PSM N15EJA	3 responses: N03ESO N06SSC N14SSM	4 responses: N04MJO N05EJA N08MJA N09PSC	3 responses: N01MJC N11PSO N12MJM
Seniority Junior: 2 Senior: 3	Seniority Junior: 0 Senior: 3	Seniority Junior: 3 Senior: 1	Seniority Junior: 2 Senior: 1
Sub-project PMO: 0 eSourcing: 1 Supp. Enablement: 2 eProcurement 2	Sub-project PMO: 0 eSourcing: 2 Supp. Enablement: 1 eProcurement 0	Sub-project PMO: 2 eSourcing: 0 Supp. Enablement: 1 eProcurement 1	Sub-project PMO: 2 eSourcing: 0 Supp. Enablement: 0 eProcurement 1
Role Consultant: 1 Analyst: 1 Management: 2 Operational: 1	Role Consultant: 1 Analyst: 0 Management: 1 Operational: 1	Role Consultant: 1 Analyst: 2 Management: 0 Operational: 1	Role Consultant: 1 Analyst: 0 Management: 1 Operational: 1

Table 4.39 Part 1, Categorised responses to Question 19

Comparison of responses classified by seniority, sub-project and role

Although there is no PM response to compare with, it is useful to note the range of responses from the interviewees. The responses were very varied and ranged from a 'good example' to a 'better economy'. During the interviews, it appeared that the interviewees tried hard to imagine a future state for the project. In addition to a BAU theme, some identified more strategic or abstract views such as achieving benefits and setting good examples relating to corporate behaviour (e.g. reducing carbon footprint) In comparing responses grouped by seniority of the interviewee and compared without reference to the PM, there does not appear to be a significant agreement between the differing levels of seniority. In comparing responses grouped by sub-project of the interviewee and compared without reference to the PM, there does not appear to be a significant level of agreement. In comparing responses grouped by role of the interviewee

and compared without reference to the PM, there does not appear to be a significant level of agreement.

4.3 Analysis of follow-up responses (by question) – follow up interviews (October 2010)

The interviewee responses from the second set of interviews have been analysed in the same way as the first interviews. The same codes have been used for each interviewee. Note that some interviewees (N03, N04, N05 and N10) were not available for the second interviews and they have been struck through (see Table 4.40 Unique interviewee codes – second interviews below).

Interviewee Number	Interviewee Code
N1	N01MJC
N2	N02SJO
~~**N3**~~	~~N03ESO~~
~~**N4**~~	~~N04MJO~~
~~**N5**~~	~~N05EJA~~
N6	N06SSC
N7	N07PSM
N8	N08MJA
N9	N09PSC
~~**N10**~~	~~N10ESC~~
N11	N11PSO
N12	N12MJM
N13	N13PSM
N14	N14SSM
N15	N15EJA

Table 4.40 Unique interviewee codes – second interviews

Part 2, Question 1 What does the [system name] project do now?

The responses to this question are shown in Table 4.41. In Table 4.42 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'unsure'.

Interviewee	Response
PM	Facilitates delivery of products - from source to pay. Hasn't changed in 'global' terms but focus is now on Trading. The problem is that this isn't the best situation as the whole project should be moved forward equally. Originally the project sponsor was Trading oriented and this led to a skewed focus on Trading. The reorganisation was about resources and trying to break the silos - there has been partial success in this respect. The number of contractors has had to be reduced as the ratio to permanent staff was too high. The change was caused by a reduction in budgets - something had to go. The Customer relationship managers were removed because it was felt that enough evidence and experience had been gained so that other staff could manage the engagement. The creation of the efficiency and investment board has promoted [system name] and has gained additional political support. This has led to a restructuring that facilitates better engagement and support.
N01MJC	More staff on the Trading strand (although they are under deployed at the moment). There isn't a project support office as such any more - (the group will now be used for business admin and support).
N02SJO	More emphasis on Trading and PROCUREMENT PORTAL, Sourcing ([System component C]) and PAYMENT CARD have been slightly de-emphasised.
N06SSC	Trading may be affected by the Efficiency and Investment Board (EIB). In general, communications in the project have been poor. Not very aware of the other workstreams
N07PSM	Products haven't changed but the processes have. We believe that we have made it easier to sign-up by removing barriers. We have increased the risk of rail-roading organisations as a result. (the main perceived barriers were the sign up process and deployment.
N08MJA	Nothing much different - but matrix management will be different
N09PSC	Project now structured so that we manage resources. Need to manage two objectives, adoption and Trading. XCW puts a lot of focus on Trading - but this is actually on a low benefit compared to Sourcing and Cards.
N11PSO	Roughly the same - little difference
N12MJM	There is a change to Trading and supplier adoption: now part of one single Trading function. Also, PROCUREMENT PORTAL is being redeveloped.
N13PSM	Focus on Service Management and the method of working. Particularly Trading. Moved to a matrix mgmt. Style (schools trading, et and SA)
N14SSM	Same
N15EJA	Same

Table 4.41 Part 1, Question 1 (All responses)

Comprehensive	Broad but not comprehensive	Simple and partial	Unsure
Number of responses: 0	Number of responses: 3 N02SJO N12MJM N13PSM	Number of responses: 8 N01MJC N06SSC N07PSM N08MJA N09PSC N11PSO N14SSM N15EJA	Number of responses: 0

Table 4.42 Part 2, Categorised responses to Question 1

Comparison of PM's responses with those of interviewees

Some of the responses showed a broad alignment with the view of the PM:

- N02SJO
- N12MJM
- N13PSM

but on the whole even though there had recently been a reconfiguration of the project there was a far from consistent understanding. Although some changes had been identified most respondents did not reflect the significant change in emphasis in the trading area in their responses. Some thought that there was in fact no change at all. The PM's response could be considered as a confusing statement as on one hand he says that the situation hasn't changed 'in global terms' but then goes on to say that there is a renewed focus on trading. Some of the interviewees took the view that there was indeed no change while others detected some more subtle changes relating to management of the project. Just one interviewee said that there would be more emphasis on trading (though this was not mentioned in isolation). On the whole, the responses suggest no significant level of alignment the PM's view on this topic. There was no particular alignment to the responses of interviewees when grouped by seniority, sub-project or role.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is worthy of note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 2: What do you understand the aims of the project to be now?

The responses to this question are shown in Table 4.43. In Table 4.44 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'simple/vague overview'.

Interviewee	Response
PM	The business requirement has been refocused by the EIB to engage and facilitate and accelerate Trading so that efficiencies are brought forward (quite a challenge - do it quicker, deliver more and with less resource). The core aims haven't changed; introduce eProcurement tools in to the public sector. There is a concern that the focus is on Trading when the benefits from the project as a whole should be emphasised. In fact Trading benefits are more long term compared to the benefits from Sourcing and cards. We are reassessing what is being delivered as a benefit per transaction - what is the reality? What is the evidence? The problem with looking at a small area rather than the whole (as a holistic) view is a failing of the project. Both internally and externally we are not looking at the whole.
N01MJC	More of an emphasis on Trading, but the aims are the same.
N02SJO	Aims are the same
N06SSC	No Change
N07PSM	The aims are still the same - to deliver high value, high quality products, but... we are getting to a point where benefits realisation meets expectations is lagging behind.
N08MJA	To enable public sector orgs to source, procure and einvoice. Basically trade electronically and gain best value. I.e. No change
N09PSC	Still same but... some intrinsic differences because of the stage in the project. Key aim - procure electronically but new aim - continue to support our customers. We need to Increase penetration and need to support existing customers.
N11PSO	To get suppliers and buyers as paperless as possible and as efficient as possible
N12MJM	Basically the same. Has a higher profile because of financial climate and visibility. Suppliers are actually asking about it and are more aware. Good understanding of PROCUREMENT PORTAL - not so good for Trading.
N13PSM	No difference
N14SSM	Same
N15EJA	Same

Table 4.43 Part 2, Question 2 (All responses)

Comprehensive	Broad overview with several specifics	Broad overview with some specifics	Simple/vague overview
Number of responses: 0	Number of responses: 1 N01MJC	Number of responses: 10 N02SJO N06SSC N07PSM N08MJA N09PSC N11PSO N12MJM N13PSM N14SSM N15EJA	Number of responses: 0

Table 4.44 Part 2, Categorised responses to Question 2

Comparison of PM's responses with those of interviewees

Only one respondent, N01MJC echoed the PM's reference to the refocusing of the project towards trading activities. The other responses mentioned correctly a number of aspects of the project but did not refer to change of emphasis. Surprisingly, even after a period of reorganisation almost all interviewees almost all interviewees stated that they thought that there was minimal or no change. The responses indicated no significant level of alignment with the PM view on this topic.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 3: Are the same workstreams still running?

The responses to this question are shown in Table 4.45. In Table 4.46 the responses except those of the PM have been placed into four categories ranging from 'number confirming Yes/no change' to 'number indicating differences in workstreams to some level'.

Interviewee	Response
PM	Yes
N01MJC	Yes, but the Supplier Adoption work stream is now part of the Trading stream. Cards have become less visible and PROCUREMENT PORTAL has increased its profile.
N02SJO	Yes
N06SSC	No Change
N07PSM	Yes
N08MJA	Yes
N09PSC	Yes, but in a slightly different way - Supplier Adoption and Trading for example. No CRM function now and we have added a strategic project lead in to SA.
N11PSO	Same
N12MJM	Yes
N13PSM	No SA is not a work stream (part of et). The rest is the same.
N14SSM	Yes
N15EJA	Yes

Table 4.45 Part 2, Question 3 (All responses)

Number confirming yes/no change	Number indicating differences in workstreams to some level
Number of responses: 9 PM N02SJO N06SSC N07PSM N08MJA N11PSO N12MJM N13PSM N14SSM N15EJA	Number of responses: 2 N01MJC N09PSC

Table 4.46 Part 2, Categorised responses to Question 3

Comparison of PM's responses with those of interviewees

The responses to this question were broadly in line with the PM's response. The responses indicated a very high level of alignment as a whole, and between interviewee responses grouped by seniority, sub-project and role to the view of the PM.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there was a common agreement illustrated within and between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project was a common agreement illustrated within and between the responses in the senior interviewee group.

Role: The two responses that indicated differences were both consultants:

- N01MJC
- N09PSC

but looking at the responses by role there was a high level of agreement within and between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

Part 2, Question 4 Is there any difference to the way that workstreams are now running?

The responses to this question are shown in Table 4.47. In Table 4.48 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'unsure'.

Interviewee	Response
PM	The matrix management process has been introduced for supplier adoption and supplier engagement. There are no resources allocated to the trading card. There are funding driven changes to the Sourcing solution. The PMO has been scaled down and changed to a Project as a whole (this is under development) to become a SMO (will need another 3-4 staff). There is also a need to support the [GOVERNMENT] exemplar project.
N01MJC	The Supplier Adoption work stream is now part of the Trading stream. Cards have become less visible and PROCUREMENT PORTAL has increased its profile.
N02SJO	Supplier adoption has merged with Trading.
N06SSC	Trading: the objective is to get a crossover of skills in each stream (e.g. PROCUREMENT PORTAL learns about Trading and vice versa). Trading has been split in to service management and implementation.
N07PSM	Matrix management has been introduced along with a more flexible approach to the management of resources and the project. The PMO is being stripped out to act as a business unit support facility.
N08MJA	Only the matrix has changed - Trading will have more resources. Should impact Supplier Adoption in a positive way
N09PSC	Supplier Adoption and Trading for example. No CRM function now and we have added a strategic project lead in to SA.
N11PSO	No
N12MJM	Workstreams are the same but the processes are different. There is some confusion about how the team members expect to line up their workload. The loss of a good leader has led to a loss of a team working ethic. Need more cross working for new starters.
N13PSM	SA is not a work stream (part of et)
N14SSM	PROCUREMENT PORTAL has a higher profile, more visible. Trading has grown with an expanded team, more implementation managers
N15EJA	No

Table 4.47 Part 2, Question 4 (All responses)

Comprehensive	Broad but not comprehensive	Simple and partial	Unsure
Number of responses:	Number of responses: 3 N01MJC N07PSM N08MJA	Number of responses: 8 N02SJO N06SSC N09PSC N11PSO N12MJM N13PSM N14SSM	

Table 4.48 Part 2, Categorised responses to Question 4

Comparison of PM's responses with those of interviewees

None of the responses matched closely with the PM's response but some captured some key elements:

- N01MJC
- N07PSM
- N08MJA

Most responses were fairly simple and did not reflect the changes. Four responses identified the structural change relating to supplier adoption:

- N01MJC
- N02SJO
- N09PSC
- N13PSM

Two interviewees clearly stated that a new matrix management process had been introduced and one of those also mentioned a change to the PMO. Beyond this, interviewees talked about the issues that were important to them but on the whole did not refer to the way that the new processes / workstreams were now operating. The responses indicated no significant level of alignment with the PM's view on this topic.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Although two of the responses that had a broader perspective were provided by the PMO, overall, looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It should be noted, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 5 How would you describe the project now in comparison to the project before August 2010?

The responses to this question are shown in Table 4.49. In Table 4.50 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'unsure'.

Interviewee	Response
PM	The fundamental project has not changed. Lessons learned and experience has changed and we can now manage the delivery better with internal resources. The project has an issue in relation to succession management as a number of key staff are due to leave.
N01MJC	It's in a worse state - because line management is poor (as compared to functional management) it has led to an imbalance in workloads. Some staff seem to have disengaged - a senior level presence in the office would help.
N02SJO	There is an emphasis on Trading and PROCUREMENT PORTAL. PROCUREMENT PORTAL in particular is recognised as being an important part of our long term strategy.
N06SSC	Trading have 3 new key staff and is in an interim stage. Not much else different.
N07PSM	Lost the SRO, lost the Project Director, impact on PMO, PMO lead is leaving
N08MJA	Progressing and achieving, but we could be more efficient and work 'slicker'. Lot of time spent on stats and reports and these are regularly redundant and of poor quality.
N09PSC	Not much of a difference.
N11PSO	We now have resource focused on service management and the PMO has a wider remit.
N12MJM	Same
N13PSM	Project is 'future focussed' and places more emphasis on existing customers (particularly et) as well as an engagement process for new customers
N14SSM	Probably very similar; a few movements of staff but roughly the same BAU
N15EJA	Much the same

Table 4.49 Part 2, Question 5 (All responses)

Comprehensive	Broad but not comprehensive	Simple and partial	Unsure
		Number of responses: 11 N01MJC N02SJO N06SSC N07PSM N08MJA N09PSC N11PSO N12MJM N13PSM N14SSM N15EJA	

Table 4.50 Part 2, Categorised responses to Question 5

Comparison of PM's responses with those of interviewees

None of the responses picked up on the issue of delivery management but it was perhaps less surprising that respondents did not pick up on the issue of succession management as this had not been widely discussed. Four interviewees however did say that they thought that little was different:

- N09PSC
- 12MJM
- N15EJA
- N14SSM

Others did say that they saw differences but these were around project emphasis, line management, reporting and resources, areas that did not feature in the PM's comments. One interviewee did mention reduction in numbers of staff. Although on the whole the responses were varied and simple, and the responses did not align with the PM's view on this topic.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 6 How will these changes affect the way that the project delivers against its objectives?

The responses to this question are shown in Table 4.51. In Table 4.52 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'simple/vague'.

Interviewee	Response
PM	Some strands will feel encouraged by the changes but some may be demotivated. But the strands are still not out of their silos. It has proved difficult to get individuals to do this! Members of our own team can't see the full end to end process - it's been like herding cats!
N01MJC	It makes it more difficult as the objectives are less clear. From a work stream view, if you're not in Trading then you might feel neglected.
N02SJO	Should speed up movement of suppliers on to the Trading system.
N06SSC	The Trading split is a good idea - should help delivery.
N07PSM	If we carry on as the changes are planned it should help to accelerate benefits. However there may be an impact on the perception of the project. May be perceived as bashing in products without proper consultation. Likely to get results long term but at what cost? We want to win friends, not lose them.
N08MJA	Hopefully should be able to deliver more quickly for Trading and Schools
N09PSC	Service management should help to grow Eprocurement is existing organisations. The PMO having a wider remit may hinder our project.
N11PSO	Process improvement
N12MJM	Some will help, but some may make things worse
N13PSM	Should be more focussed on identifying priorities and resourcing appropriately
N14SSM	Roughly the same - just placed resources in to areas that require more effort
N15EJA	SA should have more staff - better service

Table 4.51 Part 2, Question 6 (All responses)

Comprehensive	Broad but not comprehensive	Simple and partial	Simple/vague
	Number or responses: 3 N07PSM N08MJA N09PSC	Number of responses: 8 N01MJC N02SJO N06SSC N11PSO N12MJM N13PSM N14SSM	

Table 4.52 Part 2, Categorised responses to Question 6

Comparison of PM's responses with those of interviewees

More than half of the response were fairly vague and the remainder did not pick up on the points made by the PM. Of the three responses that were more specific, two were in eProcurement:

- N07PSM
- N09PSC

The PM did allude to attitude, approach or commitment of people within the workstreams and the approach that might be taken. The interviewees illustrated that they had views on this subject as they talked about future performance, organisational issues and clarity of objectives. The responses indicated no significant level of alignment with the PM's view on this topic.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups. It is notable, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 7 What is your opinion about the changes?

The responses to this question are shown in Table 4.53. In Table 4.54 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'unsure'.

Interviewee	Response
PM	Hands were tied in reality - changes had to be made because of funding changes. The changes did not happen quickly enough though - people have been worried about their posts. Would have looked to have completed the changes earlier but the organisation bureaucracy necessitated new business cases, very senior sign off leading to delays.
N01MJC	Overall - makes things more difficult. Good thing to emphasise Trading but other aspects have deteriorated such as Sourcing and epayments (cards)
N02SJO	Good changes - should bring the benefits forward.
N06SSC	Split is good. Cards and Trading might not easily rise. There appear to be too many staff in the interim planning stage (waiting for implementation projects)
N07PSM	Understand why they have been introduced but didn't have much confidence in them.
N08MJA	Good - positive change
N09PSC	Service management good; PMO not so good
N11PSO	More of the same - on a day to day basis
N12MJM	Overall good - need some leadership in certain areas as we're losing impetus. Doesn't seem to be as much interaction with suppliers
N13PSM	Good changes - needed. Yet to see actual outcome but confident that it will deliver benefits.
N14SSM	Good thing that PROCUREMENT PORTAL has been highlighted - up to date interface.
N15EJA	Good

Table 4.53 Part 2, Question 7 (All responses)

Comprehensive	Broad but not comprehensive	Simple and partial	Unsure
		Number of responses: 11 N01MJC N02SJO N06SSC N07PSM N08MJA N09PSC N11PSO N12MJM N13PSM N14SSM	

Table 4.54 Part 2, Categorised responses to Question 7

Comparison of PM's responses with those of interviewees

The focus of the PM's response was around the timing of the changes and did not really comment about the reasons for change or the effectiveness of those change with regard to the future operating model. Interviewees were less hampered perhaps in their responses as they expressed their view that the changes were good or bad. Three interviewees thought that the changes were negative, seven interviewees thought the changes positive and one had mixed feelings. The respondents did not echo the PM's comments on timing but in most cases did provide an opinion on the changes. It is notable though that most of the respondents expressed a view that changes were needed. On the whole, the responses indicated no significant level of alignment with the PM's view on this topic. There was no particular correlation between the PM's view and interviewees by seniority, sub-project or role.

Comparison of responses classified by seniority, sub-project and role

Apart from most interviewees saying that the changes were 'good' there was little else to suggest any similarity.

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 8 What do these changes mean for you?

The responses to this question are shown in Table 4.55. In Table 4.56 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'unsure'.

Interviewee	Response
PM	Have been able to step back and let the strand leaders manage. Taken a more strategic lead - less day to day tactical involvement. Also provides a benefit of a named service manager to the client. The service manager is the sole rep to the client and should eventually be able to present the benefits of the WHOLE project product range to the client (rather than just one product).
N01MJC	Increased workload - but a dilution of Project specific work. Poorer exposure to each work stream as diverted to non-project work.
N02SJO	The increase of focus on PROCUREMENT PORTAL has meant a change of role for me - promoted to work stream manager.
N06SSC	New reporting structure (new line manager). There is a new approach to implementation - 'lead and shadow'.
N07PSM	Will be promoting a reduced range. Reduced relationship management
N08MJA	Better knowledge / understanding of the other parts of the project
N09PSC	Means that time may be spent on a wider VW remit, which could mean less time on the project. Could also mean a wider range of audiences for communications.
N11PSO	None
N12MJM	New role - heading up a team. It's a return to communicating with people
N13PSM	Role changed - to service manager for Trading. Covers SA, process mgmt., supplier contract mgmt., resourcing for customer projects and change management.
N14SSM	New role - as db manager
N15EJA	Same

Table 4.55 Part 2, Question 8 (All responses)

Comprehensive	Broad but not comprehensive	Simple and partial	Unsure
Number of responses: 0	Number of responses: 2 N13PSM N06SSC	Number of responses: 8 N01MJC N02SJO N07PSM N08MJA N09PSC N12MJM N14SSM N15EJA	Number of responses: 1 N11PSO

Table 4.56 Part 2, Categorised responses to Question 8

Comparison of PM's responses with those of interviewees

This question asks what do the changes mean to 'you' and the responses do show that the respondents have focused on the change of role in the most part. The PM might have expected each interviewee would acknowledge that work stream managers will take more of a leading role and that the whole project product range will be placed in front of clients rather than a subset of the system. Two interviewees were in senior positions:

- N13PSM
- N06SSC

One interviewee saw this in exactly the opposite way:

- N07PSM

while others concentrated on changes to their role or said that there was little change. Only one interviewee reflected the view of the PM. The additional aspects related to the interaction with the client has not been mentioned on the whole. The responses indicated no significant level of alignment with the PM's view on this topic. There was no particular correlation between the PM's view and interviewees by seniority, sub-project or role.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 9 What does this mean for your public sector customers?

The responses to this question are shown in Table 4.57. In Table 4.58 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'unsure'.

Interviewee	Response
PM	We don't know! We should ask if they've seen a change. Had some positive informal feedback from Sourcing customers. Planning to carry out a structured survey this year. People leading the strands tend to focus on their feedback. Forward planning means that the project is likely to become smaller.
N01MJC	Customer Relationship Managers have gone - possibly means that customers don't get a balanced view of what is available (that will be appropriate to their business organisation). This could lead to shoe-horning of products in to an organisation, leaving us open to claims at a later date
N02SJO	Should provide better ITT functions to the public sector.
N06SSC	Positive impact for customers - a better, clearer support arrangement
N07PSM	Reduced relationship management. Lack of continuity. At risk of a perception of 'sharp practice'?
N08MJA	Implementation more straight forward - easier to enable. Better service.
N09PSC	They should get more appropriate, more tailored attention
N11PSO	Not much of a difference
N12MJM	Won't see much change – BAU
N13PSM	New customers - no change. Existing customers will have a more formal relationship and more support for rollout
N14SSM	More support - especially SA and et
N15EJA	Same

Table 4.57 Part 2, Question 9 (All responses)

Comprehensive	Broad but not comprehensive	Simple and partial	Unsure
Number of responses: 0	Number of responses: 2 N01MJC N13PSM	Number of responses: 9 N02SJO N06SSC N07PSM N08MJA N09PSC N11PSO N12MJM N14SSM N15EJA	Number of responses: 0

Table 4.58 Part 2, Categorised responses to Question 9

Comparison of PM's responses with those of interviewees

Most interviewees did not share the view that some aspects of the service delivery were unknown and most said that it would either make little difference or improve. The PM mentions that most people focus on their own strands but the interviewees have not qualified their comments to reflect their part of the system functionality, rather they have tended to provide a generic response. These responses are a mixture of comments no difference or at the other extreme negative or positive expected outcomes. The responses indicated no significant level of alignment with the PM's view on this topic. There was no particular alignment between the PM's view and interviewees by seniority, sub-project or role.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is worthy of note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 10 What do you think it will mean to the system(s) suppliers?

The responses to this question are shown in Table 4.59. In Table 4.60 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'unsure'.

Interviewee	Response
PM	Some suppliers are frustrated at the speed of delivery. We've found that it takes much more time to introduce new systems in the public sector. E.g. schools like the system, but they replicate the process of review as part of every implementation. Some system suppliers will see further reductions in revenue. Some suppliers may see new controls introduced for better supplier management.
N01MJC	Suppliers seem to be in control of the situation and some see this project as a cash cow
N02SJO	Some suppliers may take less of a role, others may take more.
N06SSC	The Trading supplier now has a split between delivery and business as usual - this won't have a huge impact.
N07PSM	Some will now have an opportunity to provide their products exclusively - this will lead to more sales for them but the credibility of the project may be compromised. This could lead to the sale of a product that is not required.
N08MJA	Clearer communication for Trading
N09PSC	No difference - Trading supplier may have a slightly wider implementation role
N11PSO	I know a bit more about the Trading system now and there won't be much of a change
N12MJM	Trading supplier - problem as we haven't checked the system in a high volume state - might go backwards! Not sure about the other suppliers.
N13PSM	Trading supplier - higher level of engagement (strategic and tactical). Sourcing - probably little change, PROCUREMENT PORTAL - no change.
N14SSM	No difference
N15EJA	Same

Table 4.59 Part 2, Question 10 (All responses)

Comprehensive	Broad but not comprehensive	Simple and partial	Unsure
Number of responses:0	Number of responses:0	Number of responses: 11 N01MJC N02SJO N06SSC N07PSM N08MJA N09PSC N11PSO N12MJM N13PSM N14SSM N15EJA	Number of responses:0

Table 4.60 Part 2, Categorised responses to Question 10

Comparison of PM's responses with those of interviewees

There was little correlation between the responses and the PM's view. Responses were specific in some cases and most expressed a view that nothing significant would change for suppliers. The responses indicated no significant level of alignment with the PM's view on this topic. There was no particular alignment between the PM's view and interviewees by seniority, sub-project or role.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 11 What do you think it means to the product suppliers (suppliers of goods and services via the Hub)?

The responses to this question are shown in Table 4.61. In Table 4.62 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'unsure'.

Interviewee	Response
PM	Companies are benefitting from the service and some have seen increased sales. As there are no transaction costs it helps to secure cost benefits - along with the benefits of eInvoicing.
N01MJC	There is a steep learning curve for traders - hopefully this will become easier with the new changes (as long as buyers also adopt / buy-in to the system)
N02SJO	Should make it easier to get on the trading hub.
N06SSC	New lead - heading up specialist projects creates a proactive approach with suppliers.
N07PSM	Short term - not much. PROCUREMENT PORTAL may provide some additional benefits. Supplier adoption should be better as it will be more hands on. The resource matrix should also help.
N08MJA	Increased benefit for suppliers - Supplier adoption is better equipped to deal with process. More effective.
N09PSC	If they do the supplier process review it should be a better process.
N11PSO	No change
N12MJM	Should see a benefit - once we sell the concept they should get more business / increasingly seen as a positive
N13PSM	Same - might be a benefit from a wider range of support available through the strategic supplier role
N14SSM	Orgs may get signed up easier / quicker
N15EJA	Better process to adopt suppliers

Table 4.61 Part 2, Question 11 (All responses)

Comprehensive	Broad but not comprehensive	Simple and partial	Unsure
Number of responses: 0	Number of responses: 2 N08MJA N12MJM	Number of responses: 9 N01MJC N02SJO N06SSC N07PSM N09PSC N11PSO N13PSM N14SSM N15EJA	Number of responses: 0

Table 4.62 Part 2, Categorised responses to Question 11

Comparison of PM's responses with those of interviewees

A small number of respondents described benefits alongside some generic benefits related to the signup of client organisations:

- N07PSM,
- N08MJA
- N12MJM

Two interviewees were in the PMO, two were in management roles. The respondents did not identify the main points made by the PM. The PM drew attention to the increased sales and reduced transaction costs for suppliers, but this was not picked up by the interviewees. The interviewees saw some benefits in approach and ease of use on the whole, but two interviewees felt there would not be any change. The responses indicated no significant level of alignment with the PM's view on this topic. There was no particular alignment between the PM's view and interviewees by seniority, sub-project or role.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 12 What do you now think will happen at the end of the project?

The responses to this question are shown in Table 4.63. In Table 4.64 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'unsure'.

Interviewee	Response
PM	Shared service may be introduced. It could go one of a number of ways: Project shuts own, employees go to the pool / break up project and push to departments / a mixture of the above / remain as a service with ex project staff. External organisations are asking for more services! The all [Country] buying function must continue as it provides cost advantages.
N01MJC	It could be a chaotic end as there aren't any planned for the closure of the project or the adoption processes. Transition is not clear to Business as usual. E.g. PAYMENT CARD is now BAU?
N02SJO	All workstreams should move to business as usual.
N06SSC	Will continue in to service management at the end.
N07PSM	As a result of the re-org, nothing is fundamentally different. We must deliver more but this will depend on how we are perceived as a project. I.e. How we treat customers.
N08MJA	It will be with more local authorities than we would have expected and we will have deployed the products to them.
N09PSC	BAU - plus a small service management group will remain to support and reinforce. May also support other implementations.
N11PSO	No difference
N12MJM	Establish service management division / support (BAU)
N13PSM	Flips over in to service management.
N14SSM	Still need a resource in place to support the organisation.
N15EJA	BAU

Table 4.63 Part 2, Question 12 (All responses)

Comprehensive	Broad but not comprehensive	Simple and partial	Unsure
Number of responses: 0	Number of responses: 0	Number of responses: 11 N01MJC N02SJO N06SSC N07PSM N08MJA N09PSC N11PSO N12MJM N13PSM N14SSM N15EJA	Number of responses: 0

Table 4.64 Part 2, Categorised responses to Question 12

Comparison of PM's responses with those of interviewees

Whilst acknowledging that five of the fifteen interviewees mentioned BAU:

- N09PSC
- N02SJO
- N01MJC
- N12MJM
- N15EJA

Although some saw it as a continuation of the project rather than the establishment of a permanent service offering, in some way there was little similarity in the responses from the interviewees even though the intended project outcome had been discussed widely at this stage. Business as usual was mentioned by some of the respondents, others. Some saw no change or offered no opinion. The responses indicated no significant level of alignment with the PM's view on this topic. There was no particular alignment between the PM's view and interviewees by seniority, sub-project or role.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 13 What do you now think will be left behind by the project when it finishes?

The responses to this question are shown in Table 4.65. In Table 4.66 the responses except those of the PM have been placed into four categories ranging from 'comprehensive' to 'unsure'.

Interviewee	Response
PM	BAU style - to maximise the use of the products. The public sector will probably not have a major change in mindset, which means that we have to focus on stakeholder engagement.
N01MJC	Workstreams will still exist for management of suppliers, systems and contracts. This will probably be based in VW.
N02SJO	Better, more efficient buying practises
N06SSC	At the end of the project [Country] will be seen as an exemplar for procurement and purchasing.
N07PSM	Leave a legacy of improved performance and efficiency with lowered costs
N08MJA	The tools should be better embedded on a wider scale and accepted as a positive way to do business.
N09PSC	Trading will fail (prove to be a white elephant) without the backing of the project. The actual cost benefit ratio may not be enough to sustain use of the system
N11PSO	No difference
N12MJM	Will bring a lot of businesses in to the 21st century! Many are electronically trading for the first time and see an increase in sales.
N13PSM	Service management.
N14SSM	More tools being used by the public sector to buy/tender/pay for goods more efficiently.
N15EJA	BAU

Table 4.65 Part 2, Question 13 (All responses)

Comprehensive	Broad but not comprehensive	Simple and partial	Unsure
Number of responses: 0	Number of responses: 0	Number of responses: 11 N01MJC N02SJO N06SSC N07PSM N08MJA N09PSC N11PSO N12MJM N13PSM N14SSM N15EJA	Number of responses: 0

Table 4.66 Part 2, Categorised responses to Question 13

Comparison of PM's responses with those of interviewees

Again there was little similarity in the responses but the intended project outcome had been discussed at this stage. There were a wide range of responses to this question, and none of them mentioned BAU and stakeholder engagement. The interviewees did see a continuation of services as an extension of the project, with ne interviewee saying that a BAU element will be provided. Some responses mentioned a strategically better position, e.g. 'seen as an exemplar'. None of the interviewees echoed the project manager's desire to further engage with stakeholders. The responses indicated no significant level of alignment with the PM's view on this topic. There was no particular alignment between the PM's view and interviewees by seniority, sub-project or role.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is interesting to note, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 14 Would you have made the same changes to the project?

The responses to this question are shown in Table 4.67. In Table 4.68 the responses except those of the PM have been placed into four categories ranging from 'agree' to 'unsure'.

Interviewee	Response
PM	Yes - and more! But quicker
N01MJC	In principle the changes are correct but the SRO doesn't seem to want to differentiate between the PSO function and the BSO function (project support V business support).
N02SJO	Pretty much so, yes.
N06SSC	Yes
N07PSM	No - but would have introduced the matrix and flexible work arrangements
N08MJA	Would support these changes.
N09PSC	Yes
N11PSO	Not sure - would probably have concentrated on process improvement
N12MJM	Possibly not but circumstances probably drove the changes
N13PSM	Yes
N14SSM	Yes
N15EJA	Yes

Table 4.67 Part 2, Question 14 (All responses)

Agree	Largely agree	Disagree	Unsure
Number of responses: 07 N01MJC N06SSC N08MJA N09PSC N13PSM N14SSM N15EJA	Number of responses: 1 N02SJO	Number of responses: 2 N07PSM N12MJM	Number of responses: 1 N11PSO

Table 4.68 Part 2, Categorised responses to Question 14

Comparison of PM's responses with those of interviewees

There was broad agreement to this question and indeed displayed the greatest correlation of any responses to the PM's view. The interviewees mostly agreed that they would have made the same changes with just 3 interviewees partially disagreeing

- N07PSM
- N12MJM
- N02SJO)

Where the interviewees did agree they sometimes also seemed to be describing differing changes compared to what the PM had described. Note that two of those who disagreed were in management roles. Overall, the responses indicated a high level of alignment with the PM's view on this topic. There was no other particular alignment between the PM's view and interviewees by seniority, sub-project or role.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role, three in consultancy roles agreed with the PM, but overall there is no particular agreement within or between the responses in the Analyst, Management or Operational interviewee groups.

It should be noted, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

Part 2, Question 15 Would you have changed anything else, or in a different way?

The responses to this question are shown in Table 4.69. In Table 4.70 the responses except those of the PM have been placed into four categories ranging from 'agree' to 'unsure'.

Interviewee	Response
PM	More changes - quicker. Frustrated at the rate of change - but authorisation is required by the business.
N01MJC	I would have like to carry out a strategy review and define what should happen in short term and long term. Not aware of that happening.
N02SJO	No
N06SSC	I Would have delayed the introduction of the new resources to a later date.
N07PSM	Set CRM's as the advisor for the customer journey, leave the PMO as is, create a strategic supplier adoption service
N08MJA	No - going in the right direction. We should carry out regular reviews.
N09PSC	Would have kept the PMO as is rather than also use it for Business support.
N11PSO	Just continue with supplier adoption process improvement.
N12MJM	Some changes are good - e.g. Target suppliers, I would have tried to get the team together informally to discuss progress and status of their own area and others
N13PSM	Perhaps minor differences - probably ring fence the PMO so that project support is not affected
N14SSM	No
N15EJA	No

Table 4.69 Part 2, Question 15 (All responses)

Agree	Largely agree	Disagree	Unsure
Number of responses: 3 N02SJO N14SSM N15EJA	Number of responses: 4 N08MJA N11PSO N12MJM N13PSM	Number of responses: 4 N01MJC N06SSC N07PSM N09PSC	

Table 4.70 Part 2, Categorised responses to Question 15

Comparison of PM's responses with those of interviewees

There was some similarity in the responses, but some interviewees indicated that they might have made other changes. Four indicated that they did not agree with the PM:

- N01MJC
- N06SSC
- N07PSM
- N09PSC

and three of these were in a consultant role. The interviewees offered a number of opinions (four indicated that they would not have changed anything else) and although the responses were not similar, they shared the PM's perception that other further changes would have been appropriate. On the whole, the responses indicated an alignment with the PM's view on this topic. There was no particular alignment between the PM's view and interviewees by seniority, sub-project or role.

Comparison of responses classified by seniority, sub-project and role

Seniority: Looking at the responses by seniority there is no particular common agreement illustrated within or between the responses in the senior interviewee group.

Sub-project: Looking at the responses by sub-project there is no particular common agreement illustrated by sub-project.

Role: Looking at the responses by role there is no particular agreement within or between the responses in the Consultant, Analyst, Management or Operational interviewee groups.

It is interesting to note again, that in general, as well as no common features in the responses by seniority, sub-project or role, there are no other sizable pockets of similarity amongst interviewees and hence no evidence of a common view amongst interviewees that differs from the PM.

4.4 Findings and emerging themes

Where the interviewees have been grouped together by seniority, sub-project and role there is little alignment with the PM or between the groups. There are however a small number of instances where there is at least some level, albeit very limited, of alignment between the PM and the interviewees, or agreement between the interviewees. In some cases there was limited alignment between the PM and the interviewees as well as limited agreement between the interviewees.

Identifying areas of alignment and agreement

The responses to questions were reviewed in order to identify if there was at least a broad alignment with the views of the PM, e.g. more than half of all interviewees expressed a similar response (PM to All alignment) and if there was an alignment with the views of the PM signified by any group having three or more group members expressing a similar response to the PM (PM to group alignment). In addition, the responses were looked at to identify if there was any agreement between the members of a single group (by seniority, sub-project or role) having three or more group members expressing a similar response to each other (intra-group agreement) or if there was any agreement between groups that had three or more members expressing a similar response (inter group agreement).

In the first set of interviews there were very limited levels of alignment in questions 7, 10 and 11 and very limited levels of agreement in questions 2, 5, 7, 10, 11,16 and 17. In the second set of interviews there were very limited levels of alignment in questions 3, 14 and 15 and very limited levels of agreement in questions 3, 14 and 15.

Alignment and agreement - first interviews

Part 1, Question 2 What are the aims of the project?:

A small group tended to mention savings and in this group three were from the PMO and two from Supp. Enablement:

- N03ESO
- N04MJO
- N05EJA
- N08MJA
- N12MJM

It is of interest though that four junior interviewees mentioned public sector savings out of this group of five. This represents a limited amount of agreement between the PMO and supplier enablement sub-groups. Another group tended to mention 'the use of eProcurement tools':

- N01MJC
- N15EJA
- N09PSC
- N11PSO
- N13PSM
- N06SSC

Note that the eProcurement sub group provided three of the responses, while those in a consultant role also provided three responses. Three of this group are in senior roles and two are in junior roles. Although this is of some interest, it is evident that it represents a limited level of agreement within the eProcurement sub group. (This demonstrates a low level of intra-group agreement).

Part 1, Question 5: Who are the main customers of [system name]?

Of the eight interviewees who mentioned the public sector:

- N02SJO
- N03ESO
- N05EJA

- N06SSC
- N10ESC
- N12MJM
- N13PSM
- N14SSM

three were in a junior role, five were in a senior role. Three were in supplier enablement, three were in eSourcing, one was in PMO and one in eProcurement. Two were in operational roles, three were in management, two were consultants and one was an analyst. This indicated within this group of eight, a level of agreement within and between the supplier enablement and eSourcing sub-groups.

Of the five interviewees who mentioned the public sector and suppliers:

- N01MJC
- N07PSM
- N08MJA
- N09PSC
- N11PSO)

two were in a junior role, three were in a senior role. Two were in the PMO and three were in eProcurement. Two were in consultancy roles, and there was one each from analysis, management and operational. This indicated for this group of five, a level of agreement within the eProcurement sub-group. (This demonstrates a low level of intra-group agreement and inter-group agreement)

Part 1, Question 7 When will the [system name] project finish?:

Thirteen of the interviewees were able to quote the correct year and of that group, three also named the correct month. The correct responses were distributed across all groups.

Three of the interviewees were able to state the correct month and year but the majority were able to name the year only. It is interesting to note that three junior staff provided the highest level of alignment (the correct year and month end date) with the PM. Four out of the 10 responses that indicated the correct year were in junior

positions. The two interviewees who had the wrong year were in senior positions, in the eProcurement sub-project and had roles as a consultant and manager. In spite of this, here was little difference overall between junior and senior interviewee responses. The responses indicated that there was some level of alignment and understanding of the PM's view on this topic. Looking at the responses overall there is a was some agreement within and between the responses grouped by seniority, sub-project or role. (This demonstrates a low level of PM to All alignment, PM to group alignment, intra-group agreement and inter-group agreement).

Part 1, Question 10 How many people work on the [system name] project?:

There was a close level of alignment from almost all interviewee responses. Although staff numbers were regularly reported in project updates only one interviewee response was exactly the same as the PM. Most other responses were roughly similar (within 10 per cent). (This demonstrates a low level of PM to All alignment, PM to group alignment, intra-group agreement and inter-group agreement),

Part 1, Question 11 If a county council wanted to send out a pre-qualification questionnaire from [software component B] what would you say should come first?:

All three of the supplier enablement interviewees were in agreement:

- N15EJA
- N03ESO
- N10ESC)

but there was no other particular alignment to sub-projects. This may be explained by the fact that these roles were closely involved with the pre-qualification processes linked to sourcing. Three of the four operational roles were in agreement:

- N02SJO,
- N03ESO

- N11PSO

(This demonstrates a low level of PM to group alignment and intra-group agreement).

Part 1, Question 16 Which work stream would you say brings the best process benefits to the customer?:

The three supplier enablement sub-project members show a similarity by including the payment card in their response:

- N10ESC
- N03ESO
- N05EJA

but it should be noted that this item was mentioned in addition to other workstreams.

(This demonstrates a low level of intra-group agreement)

Part 1, Question 17 What would you change in the [system name] project?:

Three operations interviewees mentioned 'supplier adoption'. Four interviewees mentioned communications related activity:

- N02SJO
- N09PSC
- N10ESC
- N13PSM

four mentioned Supplier Adoption activity

- N03ESO
- N04MJO
- N11PSO
- N12MJM

and three mentioned needing to be 'joined up'

- N05EJA
- N06SSC
- N08MJA

This indicated a limited agreement between some of the interviewees. (This demonstrates a low level of intra-group agreement).

Part 2, Question 3: Are the same workstreams still running?

The responses to this question were broadly in line with the PM's response. The responses indicated a very high level of alignment as a whole, and between interviewee responses grouped by seniority, sub-project and role to the view of the PM. Looking at the responses by seniority there was a common agreement illustrated within and between the responses in the senior interviewee group. Looking at the responses by sub-project was a common agreement illustrated within and between the responses in the senior interviewee group. The two responses that indicated differences:

- N01MJC
- N09PSC

were both consultants, but looking at the responses by role there was a high level of agreement within and between the responses in the Analyst, Management and Operational roles. (This demonstrates a low level of PM to All alignment, PM to group alignment, intra-group agreement and inter-group agreement)

Part 2, Question 14 Would you have made the same changes to the project?:

There was broad agreement to this question and indeed displayed the greatest correlation of any responses to the PM's view. The interviewees mostly agreed that they would have made the same changes with just 3 interviewees partially disagreeing:

- N07PSM
- N12MJM
- N02SJO

but where the interviewees did agree they sometimes also seemed to be describing differing changes compared to what the PM had described. Note that two of those who disagreed were in management roles. Overall, the responses indicated a high level of alignment with the PM's view on this topic. Looking at the responses by role, three in

consultancy roles agreed with the PM, but overall there is no other particular agreement within or between the responses in the Analyst, Management or Operational interviewee groups. (This demonstrates PM to All alignment, PM to group alignment, intra-group agreement and inter-group agreement).

Part 2, Question 15 Would you have changed anything else, or in a different way?:

On the whole there appears to be a level of alignment between the PM and the interviewees. There was little similarity in the responses, but three interviewees in management roles largely agreed:

- N13PSM
- N12MJM
- N14SSM

but some interviewees indicated that they might have made other changes. Four indicated that they did not agree with the PM:

- N01MJC
- N06SSC
- N07PSM
- N09PSC

and three of these were in a consultant role. The interviewees offered a number of opinions (four indicated that they would not have changed anything else) and although the responses were not similar, they shared the PM's perception that other further changes would have been appropriate. On the whole, the responses indicated an alignment with the PM's view on this topic. There was no particular alignment between the PM's view and interviewees by seniority, sub-project or role. (This demonstrates PM to All alignment, PM to group alignment, intra-group agreement and inter-group agreement).

Additional comments by interviewees

Below a summary of other comments provided by the interviewees is included, although it has not been used in the analysis of any measures of shared understanding. Interviewees mentioned a range of improvements that might be made in order to improve the delivery of the project.

Interviewees did mention a number of areas that may not have matched well to the project manager's view but illustrated that there were many areas that were of importance to them. Interviewees mentioned:

- a need for better information for new starters
- a need for better lines of communication
- a need for better communication inside the project
- better marketing and planning
- better approach with suppliers
- a need to be more joined up
- need for a longer term strategy
- better team working
- need to share more information between work streams
- better data management
- a better focus on the customer

Summary analysis

Table 4.71 draws together the results of all the responses to questions detailed above.

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	First interviews			Second interviews		
Question	Align - more than half agree	agreement - 3 or more in same group	agreement - more than 2 in different groups agree	Align - more than half agree	agreement - 3 or more in same group	agreement - more than 2 in different groups agree
1	X	X	X	X	X	X
2	X	√	X	X	X	X
3	X	X	X	√	√	√
4	X	X	X	X	X	X
5	X	√	√	X	X	X
6	X	X	X	X	X	X
7	√	√	√	X	X	X
8	X	X	X	X	X	X
9	X	X	X	X	X	X
10	√	√	X	X	X	X
11	√	√	X	X	X	X
12	X	X	X	X	X	X
13	X	X	X	X	X	X
14	X	X	X	√	√	√
15	X	X	X	√	√	√
16	X	X	X			
17	X	X	X			
18	X	X	X			
19	X	X	X			

Table 4.71 Summary of alignment found between responses

The analysis shows that the vast majority of responses made during the first and second interviews did not illustrate any significant level of alignment or understanding:

1. There is very little alignment between responses of the PM and the responses made by the interviewees when viewed as one single group.
2. There is very little alignment between responses of the PM and the responses made by the interviewees in any of the sub-groups (seniority, sub-project or role).
3. There is very little agreement within each of those sub-groups.
4. There is very little agreement between the sub-groups.

Where there is any level of alignment it is usually in relation to questions that were included in order to assess basic levels of knowledge.

To expand on the principal finding that here was very little alignment between responses made by the interviewees and each other and the responses of the Project Manager.

There was a low to very low level of shared understanding regarding what the project was intended to achieve: (e.g. see interview 1, questions 2,16 and 19)

Interviewees could not illustrate more than a low level of shared understanding regarding the overall definition of what the project was intended to achieve, i.e. the aims of the project. Most interviewees were able to ascribe aims to the project in general. Often those aims had some relation to the project, but they did not match those detailed by the project manager. Although the responses did not correlate directly to the view of the project manager, some responses identified aspects that would at least support the objectives described by the project manager. A very small number demonstrated understanding that might be considered to reflect the understanding of the project manager. It is interesting to note that the aims of the project as expressed by the project manager - 'To support delivery of back office efficiencies in the public sector so that it can release benefits for front line services and ultimately benefit the [country's] citizens' - were not reported back in reasonable detail except for two cases. Therefore, it appears that the activities that had been undertaken to transfer knowledge to the interviewees had not been successful or had not stood the test of time and that interviewees had established a view of project aims and objectives based largely on their own experience and interpretation. Responses to the follow up interviews some eight months later were largely the same.

There was a low to very low level of shared understanding regarding what activities were underway: (e.g. see interview 1, questions 1 and 13).

Interviewees displayed a low level of shared understanding relating to the activities that were underway. This was illustrated by the fact that interviewees found it difficult to recall or describe what the project activity was and could not easily describe some of the tasks that had been carried out inside the project. Most of the responses centred on providing information related to sub components of the project, rather than describe wider aspects of the project itself. The responses were not illogical or unfounded descriptions of those sub components, but they did not relate the main focus of what the project had actually accomplished or completed. The responses seemed to indicate very limited knowledge, or at least that whatever knowledge had been imparted at an earlier date had again eroded, even though information about the systems had been widely disseminated in the project. It appears that although considerable effort had been made to transfer knowledge about the project to the interviewees, it did not appear to have achieved an outcome where there was a transfer of knowledge to the point where the interviewees could routinely provide evidence of shared understanding. Responses to the follow up interviews some eight months later were notably similar.

There was a low to very low level of shared understanding regarding what the IS structure was: (e.g. see interview 1, questions 3,4,9,11,12,14 and 15)

Interviewees were not particularly sure about the components of the overall system and there were differing views about how some components were 'better' than others and might offer differing levels of operational benefits. It is surprising that after two years of project operation, some fundamental details were unfamiliar, such as the name of the sponsor for the project. Some interviewees seemed keen to stress the advantages of one or more component systems, rather than describe how the system as a whole might be beneficial, indicating that the interviewees had created individual, disparate views of the system, but based principally on their own perceptions and experience rather than the

project's communication output. It look as if once again, efforts to bring an enduring understanding to project participants had largely failed. Interviewees had formed their own impressions about the way that the information system was structured and would operate. Responses to the follow up interviews some eight months later were broadly similar.

There was a low to very low level of shared understanding regarding how the project was organised: (e.g. see interview 1, questions 5,6,7,8,10,17 and 18)

The level of shared understanding exhibited by interviewees regarding how the project was organised was consistent with the other findings, again being evaluated as of a low level. Interviewees offered clear, certain but conflicting views on the identity of the 'customer' in the project. For example, the project manager was very clear in describing a view of the customer that specifically included a view of the individual system 'end user' but none of the interviewees echoed this view, preferring instead to describe the customer as an organisation, rather than an individual. There was limited knowledge on the part of the interviewees relating to what might be regarded as very basic information; for example regarding the number of people in the project team and the identification of senior project staff. Again, responses to the follow up interviews some eight months later were again, broadly similar.

Summary

This research set out to answer the following research question:

> During a large project or programme, what level of coherence and consistency is apparent in key actors' perceptions of the current endeavours and envisaged end state?

This research assessed the degree of shared understanding in a large project by collecting and comparing the responses to a set of questions from the project manager and project participants. The questions were designed to capture evidence of shared understanding relating to four distinct areas:

what the project was aiming to achieve,
what was happening in the project,
what the IS structure was,
and how the project was organised.

The project manager was the reference point for some of the analysis and all answers from interviewees were compared to the project manager's response. Comparison was made between the interviewees as individuals and in their respective groups. On completion of the analysis, the answers from the participants were assessed as having a low to very low level of shared understanding, i.e. there was little evidence of shared understanding in the responses. The exercise was repeated some eight months later and again a similar low level of shared understanding was found. In relation to basic information regarding the project there was little consensus in the responses from interviewees.

At the time of carrying out the interviews, the project was not thought of as particularly poor or outstanding, but more as a typical undertaking that might be found in many organisations at that time. Analysis of the responses shows no overall alignment between the PM and the interviewees, nor was there alignment between the PM and any level of seniority, sub-group (PMO, eSourcing, eProcurement or supplier enablement) or role (consultant, analyst, operations or management). Any suspicion that the individuals might be sharing more analogous views based on the seniority, sub-group or role are also unfounded, either within or between those categories. The pattern that does emerge is

one of individuals each holding a personal view of the project, but when viewed as a group or sub group the responses seem random and lacking on collective coherence. The responses showed that there was limited understanding about what was happening in the project and what was supposed to (or might) happen towards the end of the project some years away. Despite making use of government championed techniques such as MSP and Prince2 little understanding was in place at this stage, even if it had ever existed at an earlier stage. Although many communication activities took place during the project little or no evidence of shared understanding was found in the responses to the interview questions.

As a prelude to the discussion in the next chapter it is worth asking, in the absence of shared understanding, what was the group of interviewees saying? The interviewees certainly did not appear to be making up responses when they did not know an answer. Where the interviewees did not believe that they had an answer they said so, but this was rarely the case. Where the interviewee's response did not match up to the project manager's response, their statement was rarely objectively incorrect (as in untrue), but almost always referred to information that did not relate to the project manager's response. It may have been the case that the interviewees misunderstood all of the questions but this seems unlikely. Each interviewee that did not know an answer or was unsure made this clear during the interview.

Each interviewee provided answers that were usually valid statements (as assessed by the researcher) i.e. as a statement it was legitimate but it also usually did not reflect the view expressed by the project manager or usually other interviewees.
In general terms the responses to the interviews raised a number of issues:

- Interviewees appeared to have formed their own individual opinions of what was the 'best system', even though there had been widespread communication about the project's position (that there was no single 'best' system)

- Shared understanding about the way that the information system worked was not evident
- Some seemed to believe that one system had the best benefits to the customer (e.g. Which work stream would you say brings the best cashable benefits to the customer? ' System A'.)
- Some very basic facts about the project structure were not known (e.g. Who is the sponsor of the project? 'Don't Know')
- Shared understanding about the aims and objectives as a whole was not evident
- Shared understanding about current activities in the project was not evident
- Many focussed on issues relating to working or project management practices
- Many focussed on their own area and did not know much about other working areas or were not able to describe a 'big picture' (e.g. What workstreams are you aware of? 'System B')
- Many had identified their own important project aims that did not align with the official project messages
- There was a fairly consistent concept of the customer – but this did not include elements of, or reflect the project manager's view (e.g. the project manager described a person using the systems, rather than organisations)
- Many interviewees did not seem to recognise change in the project itself

Any expectation that all the project staff members would have an excellent, very high, or even high level of shared understanding of the project was not borne out in the results of this research. Indeed the correlation was generally poor across all types of question i.e. there was little evidence of shared understanding in responses to those questions that might reasonably be considered 'straight forward' as well as those that might be considered 'more difficult'.

This research shows that the vast majority of the responses captured in the interviews showed little similarity to the responses set out by the project manager and thereby little in the way of shared understanding. They did illustrate that an amount of information had been transferred to each party and that interviewees regularly echoed this information back in their responses. It is noticeable that while the responses were largely technically

valid sentences that related to the general topic area of the question, it was the exception rather than the rule when the majority of the respondents demonstrated an understanding that broadly matched that of the project manager. A small number of the responses illustrated a similar understanding between the project manager and the team members. I.e. In some instances the words used and the overall picture created by the interviewees was a similar picture to that provided by the project manager.

It is notable that the project is regarded by its parent organisation as successful as it has met all of the financial benefit targets that were set out at the beginning of the project. The project has been recognised in several industry awards as a very successful project. It is also notable that the project was run under MSP and PRINCE2 guidelines, and carried out a number of project start up and project activities including workshops, presentations, team building events, 'away-days', formal training, project updates, newsletters and regular team updates. Nevertheless, the overall level of shared understanding from the evidence captured in this research was on the whole, Low.

On practically all occasions where an interviewee provided a response that on analysis turned out to be different to that of the project manager it appears that they were genuinely unaware that they had a different understanding to the project manager or other project team members. In addition it is clear that each interviewee had their own individual perceptions of the project status and final objectives.

If the interviewees had provided evidence of a very high level (or any other level) of shared understanding, what results might we have expected? For a high level of shared understanding, we might have expected to see a high correlation between the information provided by the project manager and every (or nearly every) one of the interviewees. The correlation would be apparent by the existence of the same statements, key words, phrases and descriptions, as the project manager had used. At a slightly lower level of

shared understanding (High) might not have had the same information echoed by all interviewees, but the majority would be describe what the project manager had said, or be very similar. A Fair level of shared understanding might have been apparent if perhaps half of the interviewees had expressed broadly similar statements as the project manager in response to more than half of the questions. A Low level of understanding might have been demonstrated where some of the interviewees had provided some matching statements but in general there were many responses that did not match up to the project manager's statements. Shared understanding at a very Low level would be identified where all of the interviewees returned responses that illustrated a low or very low shared understanding across the whole set of interviews.

This chapter described how the IS project at the centre of this research did not illustrate more than a low level of shared understanding between the project manager and team members in relation to: what the project was aiming to achieve, what was happening in the project, what the IS structure was, and how the project was organised. Furthermore, the same absence of shared understanding was observed when responses were analysed by level of seniority, sub-group (PMO, eSourcing, eProcurement or supplier enablement) or role (consultant, analyst, operations or management). The pattern that does emerge is one of individuals each holding a personal view of the project, but when viewed as a group or sub group the responses seem random and lacking on collective coherence.

The next chapter starts with a précis of the research then moves on to discuss the findings of the research and why the findings are significant. It also looks at what the research means in relation to project management and concludes with a discussion regarding the research methods employed.

Chapter 5 Discussion

The interview data gathered during this research was analysed in Chapter 4. The questions put to the interviewees covered four areas:

1. Questions about the project (Questions 1, 4, 9, 11, 12, 13, 15 and 16)
2. Questions about the organisation (Questions 2,3,5,6, and 8)
3. Questions about the project management (Questions 7, 10, 14 and 17)
4. Questions about the future (Questions 18 and 19)

Each interviewee was represented by a unique code and the data was classified and grouped to enable comparisons to be made more easily. Responses of members of the project team were compared to those of the project manager and with each other. The specific comparisons made were:

- all the project team members' responses (as a whole set) with the responses of the PM
- responses of project team members' grouped by seniority, sub-project and role of the interviewee with the responses of the PM
- responses grouped by seniority, sub-project and role of the interviewee (intra-group comparison)
- responses grouped by seniority, sub-project and role of the interviewee (Inter-group comparison)

It was found that even at the highest levels, such as the programme's overall aims, the interviewees showed little agreement or commonality of view. For example when asked (Part 1, Question 3) 'What workstreams are you aware of?', the replies illustrated a low level of alignment between the PM and the interviewees and also between the

interviewees themselves. Similarly, when asked (Part 1, Question 4) 'What are the most important functions provided by the [system name] suite of tools?' the level of agreement was of a similarly low level. Across the majority of the data the alignment between the project manager and project participants was low and the level of agreement between the various sub groups in the project was also low. More specifically:

- There was a low to very low level of shared understanding regarding what the project was intended to achieve
- There was a low to very low level of shared understanding regarding what activities were underway
- There was a low to very low level of shared understanding regarding what the IS structure was
- There was a low to very low level of shared understanding regarding how the project was organised

This is of particular interest because the project team and members of the wider organization had undertaken what could be described as a normal, typical range of communication activities. Those activities included internal and external staff workshops, senior staff presentations, team building events, 'away-days' that were aimed at sharing information, formal training activity, programme updates, regular newsletters and regular team updates. Nonetheless this range of activities had not transferred knowledge to the project team members or allowed them to develop shared understanding that could be regarded as being anything other than at a low level.

This chapter will discuss the implications of this research in four areas: management and organisations; business success, project management methodologies and information systems development. It then considers approaches that may help to create reliable shared understanding and ends with a summary of the chapter.

5.1 Potential implications of the research findings for practice

Implications for management and organizations

Project Management is in essence a special case of organizational management more generally, albeit one which Weick would describe as 'heavily rationalized' (Weick1976 p1) as opposed to the more prevalent 'loosely coupled' view of organizational activity. Taken in this wider context of organizational activity, the findings from this research may not seem quite so surprising. Whilst a rational approach to any successful change programme might commonly require shared and agreed business needs and an agreed description of a system to be created to satisfy those needs, even project management methods are viewed by some as inherently social processes with all the complexity that entails. As Walsham puts it:

> ... the social context of the use of a formal procedure includes the informal assessments of individuals and stakeholder groups, reflecting their own set of perceptions and rationalities. The outcome of a formal exercise does not therefore necessarily represent a shared interpretative scheme amongst the various stakeholders, and may not embody shared interests and values.
>
> (Walsham, 1993, p. 140)

This standpoint would place project management of information systems development in a not dissimilar position to that of many organizations that have explicit strategies, and plans to implement them. For them a random audit of staff would be unlikely to throw up much knowledge of, or agreement to, the official strategy. Indeed more than 30 years ago Hambrick (1981) was reporting 'consistent evidence that strategic awareness cannot be assumed to exist, even at high levels in an organization.' And in a more recent survey of

senior managers across US organizations, Schiemann (2009, p. 53) found that only 14% think their employees had a good understanding of the organization's strategy and direction. IS development, and project management more generally, may therefore be just another example of a lack of coherence in the degree to which organizational intentions are shared.

At a project level this research highlights the significance of the Project Manager and the way in which they conduct themselves. His own responses to the interview questions showed a command of the totality of the project. It is possible that he did not feel the need to ensure everyone else had the same level of understanding, It is also possible (although this research has not attempted to verify this) that he re-clarified and possibly even redefined targets, objectives, aims and objectives in response to queries as the project progressed. Curtis *et al.* (1988) discuss the phenomenon of 'project gurus'. In the context of system software development they note that 'On about one-third of the projects we studied, one of these individuals had remarkable control over project direction and outcome, and in some cases was described by others as the person who 'saved' the system'. There are, of course, risks in this 'project guru' scenario both in terms of their continued availability throughout the lifetime of the project and the organizational reliance on the quality of that single individual's understanding and judgement.

Implications for business success

Chapter 1 positioned this research in the context of failure, drawing attention to Pardo and Scholl's (2002 p. 1656) assertion that projects 'still fail in high numbers and the deeper causes of such failures are only partially understood'. This research has not sought to establish a causal link between lack of shared understanding and project failure but there is every reason to believe that misunderstandings over aspects such as purpose, strategies and plan will have negative effects on outcomes. This is becoming increasingly important. Williams (2005) notes that 'business is becoming increasingly projectized and

global spending on projects is now many billions of dollars annually' (p. 497). Such projectization is not limited to the private sector. As Godenhjelm *et al.* (2015) comment, activities in the public sector are 'increasingly being organised as projects and processes are often presented as and understood as projects' (p. 325). A project approach to organisational and information system change is now the norm, where 'a management environment is created for the purpose of delivering one or more business products according to a specified business case' (OGC, 2009 p. 3).

The literature review reported in Chapter 2 identified a number of instances where business success was damaged by project failure. For example, it included a case from Glass (1998) looking at the Westpac Corporation of Australia CS90 banking system project. This project failed with costs of $150 million and caused, as Glass puts it, 'a fall from first to last place among its competitors in less than four years. They had 'bet the bank' - and lost' (pp. 132-137). Glass comes to a number of conclusions relating to what can be learned from this episode, including the very important warning that 'major computing failures are beginning to affect the enterprise's bottom lines in noticeably unpleasant ways' (p. 137). In December 2011 the Times newspaper reported that the £12 billion National Health Service (NHS) National Programme for Information Technology (NPfIT) project had become 'Britain's biggest IT procurement fiasco' (Kennedy et al., 2011) having delivered little to justify even its original £2 billion price tag. The loss of £12 billion would surely qualify for Glass' classification of being 'noticeably unpleasant', occurring in an organisation tasked with delivering heath care to its citizens. The BBC identified the need to make savings related to the way that it managed digital programme assets and established a project to update its systems and management procedures in 2008. Reporting on the outcome of the BBC's Digital Media Initiative (DMI) project, the BBC itself said in April 2014 that the BBC had ploughed £125.9 million into the scheme before it was completely abandoned. These examples illustrate that the failure of systems projects are not limited to the costs of hardware and software, as serious as that may be,

but may include significant other costs associated with business disruption, lost opportunities, wasted effort and reputational damage. Such losses can prove catastrophic for organisations in the private or public domain. It seems reasonable to consider the presence of shared understanding in a systems project to be a positive rather than a negative feature; it potentially helps both to reduce risks associated with the implementation of systems and make this type of undertaking more effective because interpretation errors are reduced.

There may of course be many causes of project failure, as discussed in the literature review, and it is not possible to conclude from this or other research that a lack of shared understanding (as has been found in this research) will always lead to project failure and thereby knock on to increased risk of business failure. However, it is reasonable to hypothesise that this might, on some occasions at least, be the case. It remains to be seen whether the presence of shared understanding is able to play a very large part in delivering success but the lack of it certainly has the potential to militate against it.

Implications of the research for project management methodologies

Many project management methodologies draw on research into critical success factors. It is also the case that shared understanding is an essential underpinning upon which many critical success factors are based. Fortune and White (2006) identify the most frequently quoted critical success factors that appear in the literature. The top five critical success factors they list are:

1. Support from senior management
2. Clear realistic objectives
3. Strong/detailed plan kept up to date
4. Good communication/feedback

5. User/client involvement

It is noteworthy that the first, second, fourth and fifth factors listed are closely related to the notion of establishing effective communications. In the course of a project it is possible to confirm that communication is taking place and it is fairly straightforward to confirm that project staff have received the intended message(s) but it may be more difficult to confirm that they understood that message to a degree that achieved a useful and meaningful transfer of knowledge. In their discussion of shared understanding, Charaf *et al.* (2013) emphasise that successful knowledge transfer, mutual understanding and communication are major factors that affect information systems development. Therefore it may not be a surprise that this research identifies an aspect of communication again as an important factor in the successful delivery of information system projects.

Providers of project management methodologies give the impression that if the stages of the methodology are undertaken as specified then the project will be well managed and the project will be delivered successfully. Project management processes are put in place to help define exactly what is to be built and thereby reduce the risk of building an unsuitable system. This research looked at a project management methodology in detail (see Chapter 2, Project management methodologies and frameworks, the key features of PRINCE2). A number of processes within PRINCE2 are directly associated with establishing the desired outcome of the project. Relating directly to the continued business justification of the project, 'starting up a project' (PRINCE2 2009, p. 121) aims to ensure that the prerequisites are in place by answering the question: do we have a viable and worthwhile project? In focussing on the delivery of products (also referred to as deliverables) the PRINCE2 processes 'initiating a project' (PRINCE2 2009, p. 135) and 'managing a stage boundary' (PRINCE2 2009, p. 193) expect the product descriptions to be formally agreed at the beginning of the project and referred to (as a checklist) at delivery of those products. These product descriptions are subject to formal quality assurance methods, but primarily look for agreement among reviewers that the product

description is suitably constructed. The PRINCE2 methodology does not verify that shared understanding (or a shared mental model) exists between those reviewers. Further, PRINCE2 does not acknowledge the need to establish or maintain shared understanding as part of its methodology and this also appears to be missing from other project management methodologies.

PRINCE2 has a basic tenet that the project business case must be established (PRINCE2 2009, p. 22) and should it change, stakeholders will review the specific elements of that change and act accordingly. PRINCE2 includes advice on the business case, including how to develop, verify, maintain and confirm it at appropriate points in the project. PRINCE2 does not seek to verify that a shared understanding exists at any point either before, during or after the project. It is difficult to imagine how a business case review might be carried out effectively where the participants have a differing understanding of the project itself. This research suggests that there is the potential for stakeholders in the project to understand features of the programme in different ways. In addition, if those multiple understandings are used as the basis for the review of system features and functions then it is possible that poor decision making will result. If that is the case then it may not be possible to have absolute confidence in one of the fundamental features of programme and project management methods: the business case review. In other words, relying on the notion that participants have shared understanding that will provide the foundation for logical appraisal, discussion and decision making is not prudent as any such assumption may be false.

Munns and Bjeirmi (op cit) point out that defining 'a realistic goal' is not deemed to be something that is within the scope of project management but it appears that the intended emphasis of this quote appears to be on the word 'realistic'. It might be that an emphasis on the word 'defining' may be more appropriate, but in either case any activity to work towards that goal will be hampered if the definition is flawed. This suggests that there is a

fundamental problem for any project where this applies; if a project is being commissioned then there is every likelihood that someone believes that the goal is realistic, but there may well be other individuals in the project who do not believe this to be the case. If, as Munns and Bjeirmi suggest, it is not part of the project management remit then the situation (one of differing understanding of the project objective) may not be adequately addressed within the scope of the project methodology.

Although there is no specific method within any of the established project management methodologies that either establishes or monitors shared understanding in a project, there is an assumption that project participants will all understand the objectives and further that all participants will have the same understanding. Project management methodologies (and perhaps methodologies used in a wider context of business change) therefore should re-examine the way in which they create a robust foundation based on shared understanding for the tools and techniques that they deploy. Project management methodologies must operate in a context where shared understanding must be created before the project activity begins and is actively monitored throughout as an intrinsic element of the project methodology. With regard to what might be done to make information systems project management more effective, it could be considered a prudent action on behalf of the project manager to consider shared understanding as a desirable project attribute and to take action in order to both create and maintain the highest possible level of shared understanding. This has the potential to reduce the risks associated with the delivery of projects and help move each project towards a more successful outcome.

Implications of the Research for IS Development

Shared understanding in its broadest sense is often cited as an important feature of the design of systems. However, the focus is usually on client groups, other stakeholders and

developers agreeing on the current situation, the desired future state and sometimes how the path between the two is to be handled. These techniques range from the more conventional such as Prototyping to the more creative Animated 'Use Sketches'. Further examples may be found in Appendix A, (Creative approaches to shared understanding in systems design and development) which presents other creative approaches and techniques that are available for achieving shared understanding in these contexts. In all cases, these techniques attempt to tackle what Stowell *et al.* have described as the failure of technical solution-orientated approaches to consider the subjective nature of human decision-making. As they see it, if the client can participate fully in the design process, a greater understanding between the clients and the technologists will be achieved. Models constructed by software developers are usually attempts to represent some real world activity and so the models created are 'used as surrogates for the real world' (Checkland, 1995). Checkland and Scholes (1990) do not underestimate the difficulties in moving from designing software-driven technology-based information systems to an approach based upon mutual sense-making within social settings. They see as a major obstacle the manner in which different groups of people involved in the inquiry process use any models created.

In the context of the findings of this research it is worth asking whether the techniques of achieving shared understanding at the design stage and Checkland and Scholes' observations above provide any pointers to either further research or potential good practice for system development projects.

Approaches that may help to create reliable shared-understanding

Various approaches are utilised in information systems projects in order to define what is to be built. Some of these approaches are very common but other approaches less so. Scenarios, user stories and simulation for example are more mainstream but notably,

some rather less well known techniques are beginning to emerge including video prototyping, machinima, theatre techniques and role playing (see appendix A for more detail). These techniques, were they to be used specifically to establish and then maintain shared understanding could bring a valuable contribution to existing project management methodologies. The techniques are interesting and their intentions are clear in that they seek to make the process of creating shared understanding more effective. There appears to be a difficulty with these techniques beyond the possibility that they are of limited effectiveness, in that no matter what is presented to the user there is still the possibility that shared understanding has not been achieved. In some cases the fact that another level of abstraction is introduced may actually make it more difficult for users even though the intention is to do the opposite. Taking the use of scenarios as one example, the users might interpret certain elements of the scenario in different ways. On the assumption that one or more of these techniques will add at least some value by encouraging discussion or by making use of better visualisation, it is thought that further research in to these techniques would be highly desirable. Braunschweig and Seaman (2014) note, whether it be in the context of software development or the development of other outcomes (such as business initiatives or organisational change) developing shared understanding is a complex cognitive process that is poorly understood and difficult to investigate and Espinosa *et al.* (2004) reflect this view as they too note that there is very little agreement or consistency in the literature about how to measure shared cognition. This is an area that invites further research because the impact of better shared understanding on the huge number of projects that are carried out in the public sector alone could be highly significant.

More reliable shared understanding would form a better foundation for the use of modelling and system definition techniques similar to those described in Appendix A. However, if research in the sphere of information system modelling does take place, some caution is warranted. As Champion and Stowell (2001) for example, comment, the danger

in using models as if they are capable of representing real world human action results in a perilous oversimplification and inevitably any designs created using such approaches, once implemented, fail to match the complexity of the human social situation.

5.2 Summary

The main finding from this research is that it may be unwise for organizations to assume that anything but a low level of shared understanding exists between those working in teams undertaking large information systems projects.

The chapter has also considered the implications for practice in a wide context. Based upon this discussion chapter, the next chapter draws conclusions from the study, reviews the research method and describes the contributions that the thesis makes to the body of project management research.

Chapter 6 Conclusions

This chapter revisits the previous chapters briefly and then sets out the conclusions from the study. It then looks at the implications for practice and the academic contribution that has been made before reflecting on the research process and how it might have been improved. Finally, it discusses opportunities for further research.

To recap: the purpose of the research was to investigate the extent to which shared understanding was in place amongst a team working on a project to design and develop a large information system. The research was aimed, in particular, at investigating a project while it was in progress rather than after its completion. The literature review presented in Chapter 2 showed that, although a substantial amount of work has been undertaken over the last three decades to develop project management methods and frameworks and a sizeable body of 'good practice' guidance has been created by project management associations, there is little in the way of theoretical foundations for project management. The literature review also demonstrated that projects continue to fail. The research that has been carried out on the subject of critical success factors highlights the importance of effective communications. In the review a topic closely related to communication, shared understanding, was identified as an area of importance. However, although the literature is clear in identifying the importance of shared understanding, little or no research had been undertaken into the level of shared understanding in a live project environment. It was also clear that project management had not moved to incorporate any techniques that would confirm the presence or not of shared understanding in a live project.
Therefore, the literature review identified a clear gap that could be addressed by this research, regarding the level of shared understanding in a typical, live information systems project. As described in Chapter 3, the research question derived from the literature review was:

During a large project, what level of coherence and consistency is apparent in key actors' perceptions of the current endeavours and envisaged end state?

With this question defined, the approach taken in this research was based on an interpretive philosophical view of the world. Face to face interviews that considered various aspects of shared understanding were conducted during a live project. The findings (see Chapter 4) indicated that there was little alignment between the Project Manager and the project staff and there was little agreement between project teams or staff at different levels about what the project was aiming to achieve, what was happening in the project, what the IS structure was and how the project was organised. The previous chapter (Chapter 5) discusses the implications for research for organizations, project management and the development of Information Systems and looks briefly at approaches that may help to create shared understanding.

6. 1 Conclusion from the study

It is worth restating that the purposes of this research were to gain a better insight into the various in-project perceptions held by participants. The project that was the subject of this study was not selected because it was thought to be atypical or because it showed any particular signs of faltering.

As is common in IS projects, and project management more generally, considerable effort had been put into team building and project familiarisation activities. However the interviews were conducted two years into the project and it is clear that by then individuals were concentrating on their part of the work as an endeavour in its own right rather than as a part of a whole. Furthermore, the project did not possess the characteristics, such as those identified by Koskinen (2012) that tend to lead to communication problems. For example, the team was not dispersed, no language barriers were observed and there were no differences in technological infrastructure and work norms.

6.2 Significance for practice

Why should organisations be concerned if there is a low level of coherence and consistency in a programme or project? Efforts to renew businesses and to change existing operations in business firms are frequently organized as projects (Lundin and Söderholm, 1995). Obtaining a consistent understanding of the intended end state before a significant expenditure has been made on software or hardware obviously has the potential to increase the effectiveness of programme and project delivery. The difficulties associated with change are known to be challenging, but there is an assumption that the use of formal project management methods can minimise the impact of complications and make it more likely that a system development project outcome is seen as successful. For example, UK Cabinet Office (2009 foreword) suggest that PRINCE2 will help those running projects of any size and in any environment to effectively deliver what is required by appropriately managing the costs, timescales, quality, scope, risks and benefits. It goes on to say that the methodology allows organisations to 'focus on the business case, providing a mechanism to define what the project is trying to achieve, and the business justification for it'. There is indeed a requirement in the PRINCE2 approach that states the project must carry out regular business case reviews and confirm continued business justification of the project (or quite simply, it is not, a PRINCE2 project). One of the fundamental assumptions that the manager (and the organisation) of a project may make then, is that the project management methodology will provide a consistent approach to reviewing the understanding of what the programme or project end state will be.

PRINCE2 (2009, p.4) says that 'project management is the planning, delegating, monitoring, and control of all aspects of the project, and the motivation of those involved, to achieve the project objectives within the expected performance targets for time, cost, quality, scope, risks and benefits'. Project management might be thought of as providing the methodology that will support the project manager and organisation in 'building the

right system' and also 'building the system right'. This is described more formally by Boehm (1984) as validation and verification respectively. In Boehm's paper he looks at this topic and extends the definition of validation to 'include a missing activity at the beginning of the software definition process: determining the fitness or worth of a software product for its operational mission' (p. 75). PRINCE2 (2009, p.5) says that there are six areas that are addressed by the methodology: costs, timescales, quality, scope, risk and benefits. Of these, the first five areas relate primarily to verification whereas benefits relates more readily to the area of validation.

Looking at the four related findings in this research, one relates to validation and the three others to verification:

> There was a low to very low level of shared understanding regarding what the project was intended to achieve (validation)
>
> There was a low to very low level of shared understanding regarding what activities were underway (verification)
>
> There was a low to very low level of shared understanding regarding what the IS structure was (verification)
>
> There was a low to very low level of shared understanding regarding how the project was organised (verification)

The research described in this thesis shows that in this particular case, there was limited evidence of a coherent and consistent approach, but how might that have an impact on risk in the project with respect to validation and verification? Each area is subject to increased risk where there is no shared understanding. These are described below under the sub headings Validation and Verification.

Validation

Increased risks where there is a low level of shared understanding regarding what the project is intended to achieve

Should the participants in a programme not have a good level of shared understanding of the intended project outcome there is an increased risk of failure to accomplish a worthwhile outcome. This is because there is risk that they may be working towards differing outcomes, there is a risk of misinterpretation of system components, the deliverables may not be 'as required' and rework of system components may be needed. Attempts to review the intended project outcome (i.e. business case) may be flawed because of the absence of shared understanding.

Verification

Increased risks where there is a low level of shared understanding regarding what activities are underway

If stakeholders in a programme of work do not have shared understanding of what is happening at any given time there is an increased risk of failure for a number of reasons. Resource planning becomes difficult as people may become stretched across tasks that are not well planned or controlled. There may be a duplication of effort because managers or sub project teams are working towards different goals but believe that the same task should be completed within their domain. There may be a handicap to effective planning as the planner is unaware of what else is happening or is about to happen in the programme timeline. There could be a higher likelihood of change requests because the correct stakeholder may not be involved, particularly if third parties are utilised to deliver parts of the programme. In technical projects in particular, the quality of some deliverables may be compromised because inter-relationships are unexplored prior to design or build.

Increased risks where there is a low level of shared understanding regarding the IS structure

Low levels of shared understanding of the IS structure could lead to problems relating to effective testing as it is difficult to test something that is not well understood. There may be a risk of ongoing confusion in client discussion and assumptions relating to the functionality contained in the system. There is also the potential to duplicate functionality or assume that a function exists, where it does not. A lack of shared understanding here may lead to a situation where a particular component is used for purposes for which it was not designed.

Increased risks where there is a low level of shared understanding regarding how the project is organised

Poor levels of shared understanding here may lead to ineffective management, confusion with regard to the escalation of queries, poor definition of outcomes and deliverables, confused planning and ineffective use of teams and specialists. In addition it may lead to poor links to internal and external stakeholders, requirements management and audit.

In addition to the risks outlined above, two specific areas where a lack of a coherent, consistent understanding is an important factor is in the definition of system requirements and the review of the project business case. If there is a low level of understanding, the risk of programme failure is higher primarily because project participants may be working towards different outcomes. The research results are significant because the ability to define requirements and carry out effective business reviews is predicated on the ability to work from a starting point that views the end state in a harmonious manner.

It is widely stated that a coherent and consistent approach is essential in the management of a project and it would therefore be prudent for programme/project managers to confirm and maintain this throughout the lifetime of a programme or project. With the caveat that

few general lessons can be drawn from the findings of research into a single case of programme management, it is a conclusion in this research that such coherence and consistency cannot be assumed. The key question therefore is how might they go about achieving this in practice? There do not appear to be any tools specific to the task of creating shared understanding and conveying it. There are no prescribed toolsets – currently the programme/project manager must assess the culture and select most appropriate tools from whatever is available. It may be that the most effective project managers are adept at recognising a lack of understanding and have developed their own approach to rectifying that situation. The PRINCE2 lifecycle does not start with original need, solution assessment and feasibility studies – these are considered as inputs to the project life cycle, perhaps as separate projects in their own right. Current capability in project management methodologies may possibly be hampered by a lack of recognition that shared understanding should be established at all in addition to a lack of related, useful tools and techniques. If the business case is assumed to encapsulate the required understanding of aims, objectives and the project 'end state' then perhaps as a minimum, more attention should be given to testing understanding of the business case at regular points throughout the project. It is acknowledged by this author that the possibility of achieving a perfect shared understanding may not be possible but nevertheless it is suggested that a good, or perhaps the best possible level of shared understanding should be a project management goal in order to maximise the probability of coordinated working prior to and throughout the lifetime of the project.

In the light of the findings reported here, the following should be considered in the management of programmes and projects:

- Consideration should be given to shared understanding before the start of the programme/project as a generic theme and included in project planning

- A programme/project requirement should be to achieve a good level of shared understanding regarding the aims, objectives and business benefits of the programme/project before it begins
- The shared understanding should be documented and maintained throughout the programme/project and measures put in place to test the level of shared understanding at regular intervals but especially at gateway (approval) events.
- The verified shared understanding should be used in a feedback loop with all project participants so that the project is modified as appropriate
- Any assumption that participants have a good shared understanding of the programme/project should be identified and managed as a permanent and pervasive risk for the duration of the programme/ project through to closure and benefits realisation stages.
- As tools and methods become available that assist in the development of shared understanding, senior executives and senior responsible owners should mandate at least the review and possible use of such tools

6.3 Academic contribution

The research reported here makes a contribution on several fronts. First it is one of the very few studies of an IS development project conducted during the development phase rather than looking back after the project was completed. Secondly, it has identified the topic of shared understanding amongst project team members (rather than stakeholders beyond the project team) as a significant and under-researched feature of projects. Thirdly and most importantly it has found little or no evidence of shared understanding within a project team in relation to four important aspects:

what the project was aiming to achieve
what was happening in the project
what the IS structure was
and how the project was organised

This third aspect is very important because shared understanding of project aims, IS structures and project organisation are the foundation upon which many project management methodologies are based. This research therefore draws into question the basis of those foundations and highlights the need for within project monitoring of team understanding.

6.4 Reflections on the research process

It is difficult to make a direct comparison of the approach adopted in this research with other studies as there are very few examples of research into similar projects whilst they are still in progress. However it is possible to make some observations on the approach, results and analysis included in this research.

The research is based upon a single example. Although the results are dramatic they would have carried more weight if they had been replicated in a number of studies. Apart from the limitations of time and resources, the opportunities to carry out research on live projects is rare and so this limitation must be accepted. The research approach was selected to support the aim of considering the research question from the point of view of understanding human behaviour from the participant's own frame of reference.
The main plank of the research methodology was the structured interview and this has seemed to have successfully drawn out the information that was required in order to carry out meaningful research. Other methodologies such as a survey or group interviews may have yielded similarly useful information but it was thought at the time of selecting a methodology that structured interviews offered advantages that on balance might not have been forthcoming if those other methodologies had been adopted. Those advantages included allowing the interviewee to use their own language in describing how they saw the project and to be able to do so while away from other project team members. It was apparent at the time that surveys simply would not be returned because of time constraints but that scheduled interviews would be highly likely to succeed. Group interviews may have allowed a consensus to be created but this research was specifically looking for the understanding of the individual, rather than that derived by a group. Looking back there might have been an opportunity to carry out individual interviews and then carry out group interviews and carry out analysis that might have provided an insight into other phenomena such as groupthink. At the time though it was believed that by

carrying out fieldwork using individual structured interviews it was hoped that it would generate findings that would contribute to a better understanding of the extent to which individual members of a project team share a consistent view of the current state and visualisation (envisagement) of the end state for which they are aiming during their involvement in a large scale, enterprise wide system development project.

The group of (fifteen) people who took part in the first interviews did so willingly and were supported by managers and supervisors in the organisation under examination. The follow up interviews, carried out with twelve members of staff was equally well supported and were carried out in an identical manner to the first set. The size of the group may be considered by some as relatively small but it is not believed that this has caused any misleading conclusions to be formed during this research project as there has been a remarkable consistency in the results from both sets of interviews. That is not to say that further research is not required, in fact it is suggested that more research into a number of areas would be appropriate. Looking back at the decision to use interviews as the main methodology, it has largely been justified by the quality of the information provided by the interviewees but that is not to say that it was the only method available. Other qualitative and quantitative approaches to determining the level of shared understanding in a project are the subject of more recent, wider research. Braunschweig and Seaman (2014) for example discuss other structured techniques for assessing shared understanding. Concept mapping is such a structure based visual technique that creates a diagram that describes concepts with lines drawn between them to signify relationships and represent knowledge structures but as Braunschweig and Seaman explain, there are potential issues regarding the concept mapping technique, suggesting that as well as being too dependent on the visualization skills of the team members, concept maps may be confused with class diagrams, possibly leading to confusion. If this approach had been available at the time of the interviews it is unlikely that it would have been taken up because although it might have yielded different insights, the risk of utilising a relatively new research method during a rare opportunity to carry out in-project research might have

been too high. Despite these potential pitfalls should the research in this thesis be revisited then it would be prudent to review these structured techniques as an addition to or replacement for the interview techniques employed in this research.
Another important factor was the selection of interviewees. Interviewees were identified using a mixture of natural and judgement based sampling. In this case it was seen as important that there was representation from across the whole project i.e. the research would be representative of all of the people in the project. This was achieved as consideration of the views of staff from all areas of the project were in the first and the second interviews.

A decision not to record interviews was taken as it was seen as a barrier to a natural and open discourse with the interviewee, but this introduced a risk that note-taking might not be accurate or might even have missed some information. This risk was managed by confirming the notes during the interviews and because the notes were written up in good time it is believed that they are a valid reflection of the interviewee's comments. Interpretation of the responses is another thing altogether. An interviewer will bring their own experience and inbuilt view of the world to any analysis of interview data which brings with it a risk that a bias is introduced. In this research however, great effort has been made to compare responses on the basis of what was actually said in a consistent manner, throughout both sets of interviews. Having said that, it is not clear if a researcher will ever be completely free from bias and if they will ever truly be able to place themselves above the influences of their own cognitive profile and knowledge. The important thing is for the researcher to be aware of their own position in the framing of the research, the collection of data and the interpretation of results.

Another potential problem was the fact that the intention was to carry out field research on a project where the researcher was working in the same organisation as the project team. This inevitably had an influence on the research. The researcher was more

knowledgeable about the project and the people than an outsider would have been but the interviewees may have approached the interviews in a different way had the interviewer been a completely unknown outsider. The use of pre-prepared structured interview questions, a consistent interview approach and rigor in the way that responses were captured (consistent note taking) were all designed to reduce the likelihood of prior knowledge colouring the interview processes. In general it appeared that the interviewees were confident in the assurances made by the researcher that the information received would be confidential, something that may not have been achieved by an external interviewer.

The project under investigation in this research is complex and this in itself makes it difficult to take a holistic view of all of the factors that may affect shared understanding. Every effort has been made to explore the technical and management features of the project in order to support the research process and the analysis of information that was provided by the interviewees.

Some rewording of one or two questions would have been carried out if it had been possible to predict some of the responses. One question was particularly weak in that it failed to elicit much more than a simple yes/no response, even after challenging that response with the interviewee. On the whole however, the questions served their purposes well and are considered to have been appropriate and have produced useful and meaningful responses.

The final issue relating to the research was causation. The research did not look at the relationship between shared understanding and project success. On the basis of this research it is not possible to say that that a low level of shared understanding will cause a project to fail. However, it is not possible to say that any risk factor or the absence of a critical success factor will cause the failure of any project, and for that reason it is believed

that this research does point towards a risk factor (lack of shared understanding) that should be the subject of further research.

6.5 Opportunities for further research

As stated at the beginning of this thesis, the vast majority of research studies into the efficacy of information system (IS) development have been conducted in retrospect i.e. after the systems have been implemented or abandoned. As a consequence, certain aspects of IS development are under-researched or under-evidenced, particularly those that rely on the memory of those involved. As Chapter 1 pointed out, in recent years there have been a number of calls, such as Blomquest *et al.* (2010) and Lalonde *et al.* (2012), to expand project management research and also to re-balance project management research in order to increase the emphasis on practice-based research. Furthermore, Cicmil (2006, p. 36) has argued that project theory would be served by a qualitative approach with a critical interpretive approach that make it possible to 'generate alternative understandings of what goes on in project practice and how practitioners participate in and manage complex organizational arrangements labelled projects in their local environments.'

The findings of this research undoubtedly support the position that research into practice and 'live' research is academically rewarding. The findings of the research into this specific project were not readily predictable from previously reported research.

One argument for such practice-based research is that it may help increase success rates. Large-scale information system projects are prone to failure (Fortune and Peters, 1995, Fortune and Peters, 2005). As Pardo and Scholl (2002, p. 1656) comment, such projects 'still fail in high numbers [and] the deeper causes of such failures are only partially understood'. Wright and Capps (2010) for example, suggest that the consensus is that 20 per cent to 30 per cent of all IS development projects are perceived to be overwhelming failures, while 30 per cent to 60 per cent are partial failures.

As far as shared understanding is concerned, some research points to techniques that have the potential to bring about better definition and management of shared

understanding. This research employed the survey as its primary method for capturing a view of the level of shared understanding in a particular project and of course this might be employed by others where appropriate. Perhaps other analysis techniques such as concept mapping or relatedness ratings might bring more structured techniques to the assessment of shared understanding. Other techniques such as those employing relatedness ratings combined with other techniques such as pathfinder analysis (as for example developed by Braunschweig and Seaman (op cit)) have the potential to bring a level of confidence to projects that is based on a sound academic basis and have been thoroughly researched and developed into sound, effective methods.

Project management methodologies (and perhaps methodologies used in a wider context of business change) may have to re-examine the way in which they create a robust foundation for the tools and techniques that they deploy. Without shared understanding of the undertaking itself it is difficult for participants to discuss the present or future state and therefore it is difficult to make decisions that allow them to work towards the same objectives. Although there is no specific method within any of the established project management methodologies that either establishes or monitors shared understanding in a project, there is an assumption that project participants will all understand the objectives and further that all participants will have the same understanding. The evidence from this research is that, even bearing in mind that this is a single case, it is unlikely that shared understanding will exist in anything but at a low level and this topic area should form the basis for further research.

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Appendix A Creative approaches to shared understanding in systems design and development

Scenarios

Scenarios describe the use of a system in terms of situations, interactions between agents, and events unfolding over time. Carrol (2000) says that scenarios are stories about people and their activities and notes five reasons for scenario based design; scenarios evoke reflection in the content of design work, scenarios are at once concrete and flexible, scenarios afford multiple views of an interaction, scenarios can also be abstracted and categorized and scenarios promote work-oriented communication among stakeholders, helping to make design activities more accessible to the great variety of expertise that can contribute to design.

Scenarios are widely used in a number of ways during the development process and by a variety of participants. UML Use Case is a form of scenario description. Scenarios are used by stakeholders to communicate what is wanted and they are subsequently used to test that understanding by system developers.

User Stories

Cohn (2004) says that a user story describes functionality that will be valuable to either a user or purchaser of a system or software. User stories are composed of three aspects:

- a written description of the story used for planning and as a reminder
- a conversation about the story that serves to flesh out the details of the story
- tests that convey and document details and can be used to determine when a story is complete

Jeffries (2001) calls this the card, conversation and confirmation approach and should be seen as 'social' user stories rather than 'documentary' requirements practices such as use cases.

Cohn (op cit) says that to succeed, a project relies on information from the heads of very different people and that user stories provide some advantages. The user story emphasises verbal rather than written communication, are readily comprehensible by users and other project participants, they are useful for planning and work well with iterative development of systems. In addition they have the added benefit of deferring detail until there is the best understanding about what is really needed.

The Agile Alliance describe the three 'C's as:

- a 'Card' (or often a Post-It note), a physical token giving tangible and durable form to what would otherwise only be an abstraction
- a 'Conversation' taking place at different time and places during a project between the various people concerned by a given feature of a software product: customers, users, developers, testers; this conversation is largely verbal but most often supplemented by documentation
- the 'Confirmation', finally, the more formal the better, that the objectives the conversation revolved around have been reached

The user stories are written by business owners so are free of jargon and cover one piece of functionality.

Simulation

Shrader (2001) describes the use of simulation software in the development of a business case for change for a government department. Shrader created process maps (processes, inputs and outputs, processing times, resources and business rules or assumptions) and these were used to code a simulation model. Several iterations of the process map were developed and then simulation software (Rockwell Arena) was used to

create a simulation that could be seen by users. The opportunity to see a working model and animation led to a number of benefits:

- User representatives were able to point out additional business rules
- The model itself became a focus for project recognition
- The government agency developed a sense of ownership, following the delivery of feedback
- The model helped 'validate' the process maps

The model provided a simulation of the new business processes and allowed the agency to develop a better understanding of current and proposed system operation.

Video prototyping

Mckay (1988) discusses video prototyping as a technique that is particularly effective for developing highly interactive, information-intensive software, simulations and multimedia databases. Mackay refers to iterative design methods, as the process of creating a version of a program, testing it and using the information to revise the software. Those steps are repeated (iterated) until the authors are satisfied with the results (or they run out of time or money). Where a problem is well understood, Mackay states that a structured approach to software development is a suitable strategy but that where the problem is not fully understood (or that the end goal is not well defined), a better strategy may be an iterative approach to software development by creating and testing prototypes. Mackay developed a method of presenting a screen to a user during development that was actually created dynamically by a person, rather than operational software. The designer monitored the way that the user interacted with the system (known as a 'wizard of Oz' technique) so that design decisions could then be made. Bardram (2002) *et al.* discuss the use of video prototypes in the design and implementation of mobile and pervasive computer technologies. They acknowledge the experimental nature of the design process and that design is an experimentation that consists in reflective 'conversation' with

materials of the design situation. The designer works selectively in different materials experimenting with different aspects of his design at different stages in the design process. The design representations may facilitate experimentation at low risk and cost by eliminating or inhibiting constraints of the constructed world. In this way, several alternatives can be easily created and explored. Using various design materials, the designer is able to experience how it would be in the real world. They go on to discuss the important issue of context in design. They assert that since successful design requires a match between the future system and its context we need to have representations of the future context of use as well; we need to mock-up the context so to speak. A way to address the issue of context is to work with scenarios. They report on their efforts to combine elements of prototypes, mock-ups, scenarios and conventional video in the creation of virtual video prototypes. They believe that the virtual video prototype is a way for the designer to make the important link between a scenario, a computer prototype and the creation of a realistic context. The video prototype is therefore another tool in the designer's toolbox.

Machinima

Lowood (2006) says that the word 'machinima' was derived from 'machine cinema' but that a more apt derivation might be 'machine animation'. Whether we think of machinima as cinema or animation, it means making animated movies in real-time with the software that is used to develop and play computer games. Bardzell *et al.* (2006) say that video prototyping is an established technique but draw attention to the fact that even though it is useful and may be used in the early stages of the design process it is still an expensive technique. They suggest that Machinima will offer a new approach to video prototyping. They explain that Machinima is both a filmmaking technique and a film genre in which some or all elements are staged, recorded and produced within the virtual environments found in many video games. They also explain that Machinima as an art form has its

roots in early 3D games such as *Quake;* however, in and out-of game screen-capture technologies have helped Machinima grow into an entire genre of films set in virtual environments. This phenomenon has in turn, driven the development of dedicated machinima-making tools. As a video development platform, machinima provides both advantages and disadvantages when compared with traditional filmmaking. Perhaps the most obvious advantage is machinima's reduced need for physical resources. Because machinima is created within virtual environments, the need for human actors, physical props, and advanced post-production techniques is drastically reduced or even eliminated entirely. This gives producers the power to produce movies more rapidly and cheaply. Current-day machinima, however, is usually created within fairly stringent constraints. These constraints are intrinsic to the specific environments in which the content is created. 3D games, for example, are rarely created with filmmaking in mind. Thus, filmmakers wishing to create a video clip based in a game such as *The Sims* will likely be forced to create most of their shots and storyboards within the context of indoor environments. Only the character and prop modifications available within the game's environment may be used. Despite these limitations, Bardzell *et al.* suggest that Machinima is an emerging method with potential for video prototyping and warrants investigation. Elson and Riedl (2007) say that there are two central challenges to machinima creation. First, a script must be created that describes dialogue, movements and gestures for computer-controlled avatars to perform in a video game environment. Second, the script actions must be visualized as an aesthetically coherent visual narrative, rendered as a 2D projection of activity occurring within a 3D graphical environment. They say though, that these challenges can be overcome to support human-authored machinima or industry pre-visualization.

It remains a doubt for this author about the way that the machinima, will be able to overcome the problem of interpretation of the proxy world itself, unless it is able to provide a level of realism that is undisguisable from reality.

Theatre techniques and role playing

Traditional system analysis tends to utilise one to one and group workshops for requirements definition, but Sato and Salvador (1999) suggest the use of theatre techniques for engaging users in group sessions. They believe that sessions of this type are fundamentally better than the presentation of a video to describe system usage and to stimulate criticism and discussion. They also suggest that the use of live actors in 'focus troupe' sessions create a better environment for elicitation and development of system ideas. The 'focus troupe' differs from a focus group in a number of ways:

- there are live performers – actors or staff
- scheduling of attendees is more complex
- system designers are present during the troupe session

They also note that science fiction movies are particularly good at highlighting the functionality of or interaction with a new technology... 'When new or unusual technologies are presented in science fiction movies, often the audience accepts and understands their function, even when the details are not understood; the movie provides a context that makes the device coherent'.

Svanaes and Seland (2004) investigate the use of role playing in the description of mobile system requirements. The techniques developed by Svanaes and Seland are based on a role playing workshop, where domain experts are allowed to act out and improvise a scenario of system use. They make use of a facilitator to run the session and are dogmatic in NOT allowing the system developers and workshop facilitators to influence the creative process. They have found that the workshop format to be of particular value in projects that involve mobile technology and multiple users. Seffah and Metzker (2004) note that the human-computer interaction community have developed a large variety of user-centred techniques, but these methods are still underused and difficult to understand by software development teams and organisations; they suggest that this is because the techniques have been developed independently from the software engineering

community. They also acknowledge, 'that tools are needed to support developers in acquiring and sharing user centred design and software engineering best practices and they should also help to refine and evolve basic methods to make them fit into their particular project context. Furthermore, tools are also needed for analysing and visualising the voluminous mount of observational data that we generally collect during usability studies'.

Storytelling and metaphor

Casey (2005) *et al.* recognise the difficulty in defining requirements and comment that the same problems have been prevalent for many years. They acknowledge the difficulty in creating software systems and suggest that the problem of creating a bridge between 'IT' and the broader organisation is not only of the same order of difficulty but are aspects of the same problem. They suggest that it is a fundamental problem of communication that reduces the effectiveness of the requirements definition process and that the 'conduit' approach is not sufficient on its own to impart knowledge or understanding. On examining the use of story and metaphor in organisational conversations, Casey suggests that they may provide a mechanism for overcoming the requirements definition problem. They note that narrative descriptions, widely used in the 70's, have fallen from favour in the search for unambiguous software system definition, but that DeMarco suggested that 'a suitably partitioned specification with narrative text used at the bottom level makes a fine statement of work'. Casey suggests that the first stage of understanding requirements be in understanding how the organisational participants understand their own situation through the use of story and narrative. Alvarez and Urla (2002) discuss the use of user derived narrative that could form part of a requirements definition exercise. Whilst noting that the 'stories' provided by users during interviews were messy and produced somewhat 'uncodeable' data that might be considered incompatible with tools such as data flow diagrams, repertoire grids, activity sheets or object diagrams, it was possible to illicit

important information organised, rich, meaningful information about the system, habitual practices, and the cultural and political environment of the interviewee. They suggest that perhaps it is not the requirements that we should ask for, but rather a good story. Neilsen and Madsen (2006) investigate storytelling as a method for sharing knowledge. They describe it in the context of sharing knowledge across IT projects and conclude that project knowledge could/should be captured and shared as stories through oral storytelling. They suggest that the narrative perspective makes it possible to pull together the unarticulated knowledge with explicated facts and principles gained from other sources. Rao (2006) describes how storytelling has become a key part of course delivery in a software engineering course, allowing lecturers to illustrate concepts in a more effective way. Rao also describes how this technique may elicit more information and more effective thinking in the way that systems or problems are considered.

Scenarios with 'rich' user descriptions

The use of scenarios by system analysts, in the development of system requirements is common but it is not common to describe the attributes of users. Nielsen (2002) presents an investigation into user-descriptions in scenarios. He begins by raising an important point: How can you predict the goals and actions of a user, when you don't know anything about the user as a person? Nielsen defines a scenario as 'a written story that describes the use of a system ... from a specific, and often fictitious, user's point-of-view. It is created around a protagonist, a setting and a goal.' Nielsen quotes from the script of the film 'Thelma and Louise'. Two paragraphs at the beginning of the script describe the main characters:

RESTAURANT – MORNING (PRESENT DAY)

LOUISE is a waitress in a coffee shop. She is in her early-thirties, but too old to be doing this. She is very pretty and meticulously groomed, even at the end of her shift. She is

slamming dirty coffee cups from the counter into a bus tray underneath the counter. It is making a lot of RACKET, which she is oblivious to. There is COUNTRY MUZAK in the background, which she hums along with.

THELMA'S KITCHEN – MORNING

THELMA is a housewife. It's morning and she is slamming coffee cups from the breakfast table into the kitchen sink, which is full of dirty breakfast dishes and some stuff left from last night's dinner which had to 'soak'. She is still in her nightgown. The TV is ON in the background. From the kitchen, we can see an incomplete wallpapering project going on in the dining room, an obvious 'do-it- yourself' attempt by Thelma.(Khouri 1990)

It is interesting that a range of information about the two main characters is provided without explicit statement:

- where the characters are situated
- the characters names, age and sex
- their social status
- occupation (waitress, housewife)
- marital status
- temper (self-control, lack of self-control)
- character traits
- life situation (frustration)

Neilsen describes the use of a 'rounded user' in the development of character centred screenplay. Developing a description of a character, or rounded user would involve looking for

- multiple traits
- psychology, physiology and sociology
- inner needs and goals, interpersonal desires, professional ambitions

Nielsen suggests that the use of a 'rounded user' character in scenarios will help to develop systems that satisfy user requirements and that the rounded user, visualised in scenarios could help the analyst to engage with the user with empathy, thereby

remembering the user throughout the design. Nielsen notes that it differs from the fiction film script in that the description must be based on knowledge of actual users, on how they act and where they act... it is based on facts and not on fiction. This approach would have an impact on the way that research into user requirements is carried out. It would become important to pay attention to:

- the users' surroundings
- the character traits that characterise the users
- the goals and tasks that characterise the users

It might be useful to consider though, the possibility of presenting the scenario (rather than being part of the creation of the scenario) will lead to the same difficulty where it could be interpreted differently by participants with differing cognitive conditions.

Game based Learning

Game based learning (GBL) is a type of game play that has defined learning outcomes. Generally, game based learning is designed to balance subject matter with gameplay and the ability of the player to retain and apply said subject matter to the real world.

All *et al.* (2014) say that three types of digital game-based learning (DGBL) can be distinguished aiming at knowledge transfer (cognitive learning outcomes), skill acquisition (skill-based learning outcomes) or attitudinal/ behavioural change (affective learning outcomes). Prensky (2003) says that from business simulators to pre-school 'edutainment' titles, a new learning paradigm (learning via play) is gradually emerging. He notes a number of examples; typing games are among the top-selling software products, high school students play a multiplayer online game to learn electoral politics, financial traders use computer games to hone their skills, policy makers play a Sim City-style game to understand the health care system and business executives play at running simulated HR departments and oil refineries. Said (2004) discusses an engaging multimedia design model. In a discussion of what works or does not work for children in the field of

multimedia, she notes that multimedia products presented to children often do not receive favourable reviews in relation to design. Said describes how the popular game 'the Sims' was used as a vehicle for investigation as it had a number of interesting properties: simulation interactivity, construct interactivity, immediacy, feedback and goals. Through a number of discrete studies, Said noted that compared with more traditional multimedia and book based techniques, for children with an age range of 10 to 14 the Sims created a higher level of engagement, especially where the children were allowed to interact more fully with the system.

Using software objects to visualise software scenarios

Alspaugh *et al.* (2006) acknowledge the difficulty in enabling non-experts to understand a software system and the scenarios of usage. They suggest that visually modelling a collection of scenarios as social interactions can provide quicker and more intuitive understanding of the system described by those scenarios and that their narrative form and use of natural language take advantage of people's natural ability to understand stories. There are also challenges, especially where there is more than scenario to consider at once. The concept is based on the idea of the 'memory palace', a mnemonic device that involves making a connection between pieces of the information and different physical locations. Their research centres on the use of a scenario language with structure, semantics meaning and automated tool support (ScenarioML). The scenario software presents a 3d visualisation of a business scenario to the stakeholder. They note that Rich Media enhances the effectiveness of scenarios for walkthrough, analysis and elicitation of further requirements, but suggest that the cost of such visualisation and the difficulty in producing rich media for systems that do not yet exist make it prohibitive; they believe that their visualisation, which is produced directly from the scenario itself offers a far less costly approach. One of their conclusions is that the value of their system lies in the fact that, upon viewing the visualisation of the scenarios, that they themselves had

created, the designers of the system found numerous errors in those scenarios... in addition, the visualisation made it apparent how to correct those errors.

Rich media scenarios

Rich media scenarios include some form of pictures, video and sound in addition to more traditional text based system documentation. Zachos *et al.* (2005) describe the use of Art-Scene, a tool that supports using rich media scenarios in requirements discovery and definition. Art-Scene includes rich-media representations of scenario events – visual, video and audio - and text descriptions. In use of the Art-Scene product, it was noted that experienced analysts discovered an additional set of requirements using rich-media information, as compared to using more traditional text based resources.

Visualisation

Quick *et al.* (2004) describe a visualisation system, in this case a visualisation of a manufacturing facility. They note that it is easier and faster to build a simulation if it is composed of reusable animation objects and animation behaviours. In relation to visualisation the user should be able to focus on events of interest without having to care too much about areas of operation or time areas which are less interesting. They note that significant efforts are underway to define standard visualisation techniques.
There may be other more accessible simulation techniques or programmes available to technical and non-technical stakeholders.

Cinematic-like development

There are a number of systems and approaches to cinematic-like (movie or film) development and authoring. Baeker *et al.* (1997) describe a multimedia system for

authoring motion pictures. The Movie Authoring and Design System (MAD) provides multiple media views for visualisation and brings together a range of media types so that it may be run as a linear story. The system allows the user to jump to any part of the story and play the material – sound, image, video etc. Thompson (2004) discusses the opportunities that are beginning to emerge for professional animators. She notes that computer animation is used in an increasingly wide range of activities; 'computer animation is used in legal re-creations, industrial animations and virtual theme-park ride films. Animation can recreate an ancient city or prehistoric animals for a museum. Medical visualisations help train medical staff in new surgical procedures or teach nurses about patient care. Animated films train technicians in new assembly techniques for the space station or help NASA scientists explain their projects to gain government funds... the field is expanding exponentially.'

Horberg (1994) discusses the role of professional communicators in software engineering. Horberg asserts that it is already accepted that communicators should be involved in the software development process, and that communicators in other fields should look to place themselves in development environments. He also notes that this may be a formidable task as, especially in lean economic times, technical communicators face pressure to justify their existence even within their own departments. Horberg's research acknowledges that each stakeholder has a particular view of the world – a frame of reference; if they had the same frames of reference the parties involved 'framed' the world similarly, they would probably have few problems in communicating with each other. Horberg (op cit) makes a number of observations; software engineers prefer to deal with system requirements that can be verified and tested... this is one reason why effective communication techniques are not often used in software development projects, even though research shows the need for and the value of such communication. Even when software designers take a user centred approach to building software, they do not necessarily collect good information. Horgen's paper also notes that video is rarely used in exploring requirements, and that some technical documents are full of jargon, acronyms

and technical language... leading to some confusion and misunderstanding. Horgen suggests that with proper training and understanding of the software development process, technical communicators can incorporate visual elements into requirements and specification documents.

A formal method, used by analysts to define what is to be built by systems developers, is required as it brings a level of certainty to what will be delivered as a finished product. A method such as UML is a good example of such a tool, but it may be the case that such tools should be complimented by a range of other simulation and visualisation techniques that would further minimise the risk of delivering systems that do not meet user expectations. The software engineer, would then convert the visualised requirement into a logical specification and plan, in much the same way as a civil engineer would create a building after a client had walked through the 3d visualisation. Boehm (1988) notes some technology trends affecting software engineering for usability and cost-effectiveness; increasingly powerful enterprise support packages, data access and mining tools, and personal assistant (PDA) capabilities; 'In terms of future software process implications, the fact that the capability requirements for these products are emergent rather than pre-specifiable has become the primary challenge. Not only do the users exhibit the IKIWISI (I'll know it when I see it) syndrome, but their priorities change with time.'
A common theme is the need for stakeholders to visualise or imagine the system that systems engineers will build in order to meet their needs.

Champion *et al.* comment that the danger in this approach is that using models *as if* they are capable of representing real world human action results in a perilous oversimplification and inevitably any designs created using such approaches, once implemented, fail to match the complexity of the human social situation. The data models and object models created as a precursor to software construction are devices to facilitate the marshalling of knowledge into a suitable format for the task at hand, in other words these devices are

used for the purpose of sense making. Champion *et al.* also suggest that what is needed in a process of information systems design is some means to facilitate the necessary shifts in thinking, from a focus on what purposeful action to take, through to a focus on how might that action unfold, before thinking about what support might be required. These shifts in focus must be obvious to all those involved; so open discussion can occur.